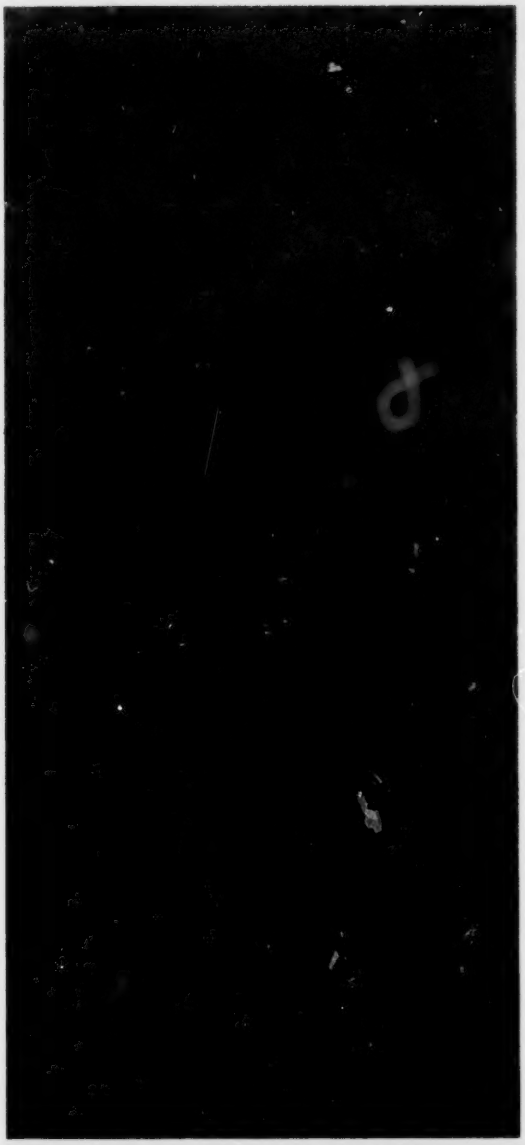
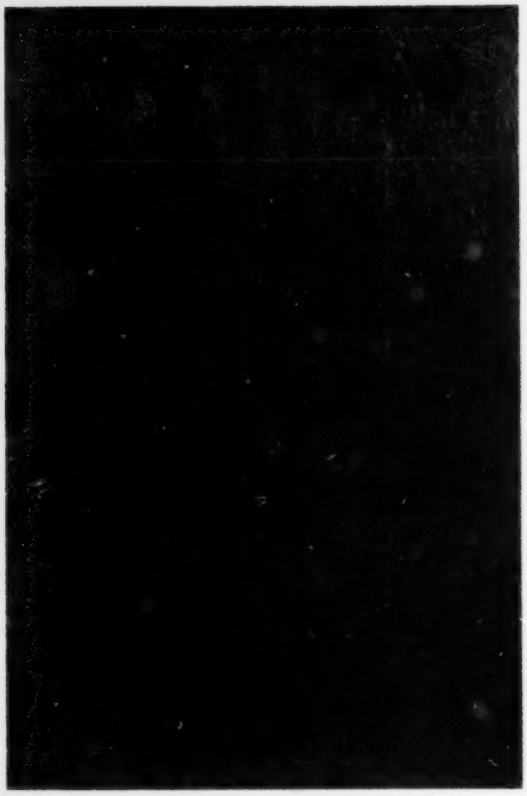
MINISTRY OF ENVIRONMENT

an'nu-al re-port 1985-86





en-vi-ron-ment (en-vi'ren-ment, in-) *n.* **1.** Something that surrounds; surroundings. **2.** The total of circumstances surrounding an organism or group of organisms, specifically: **a.** The combination of external or extrinsic physical conditions that affect and influence the growth and development or organisms. **b.** The complex of social and cultural conditions affecting the nature of an individual or community.

— **en-vi'ron-ment'al** (-ment'l) *adj.*
— **en-vi'ron-men'tal-ly** *adv.*

Stephen Rogers, Minister
Ministry of Environment and Parks

87-02263/

Province of British Columbia
Ministry of Environment
Annual Report, 1985/86

Honourable Stephen Rogers
Minister

B.E. Marr
Deputy Minister

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To His Honour
The Lieutenant Governor of the
Province of British Columbia

May It Please Your Honour:

Herewith, I beg respectfully to submit the annual report of the British Columbia Ministry of Environment for the period April 1, 1985 to March 31, 1986.

Stephen Rogers
Minister of Environment
and Parks

The Honourable Stephen Rogers
Minister of Environment and Parks

Sir:

I have the honour to submit the annual report of the British Columbia Ministry of Environment for the period ended March 31, 1986.

B.E. Marr
Deputy Minister

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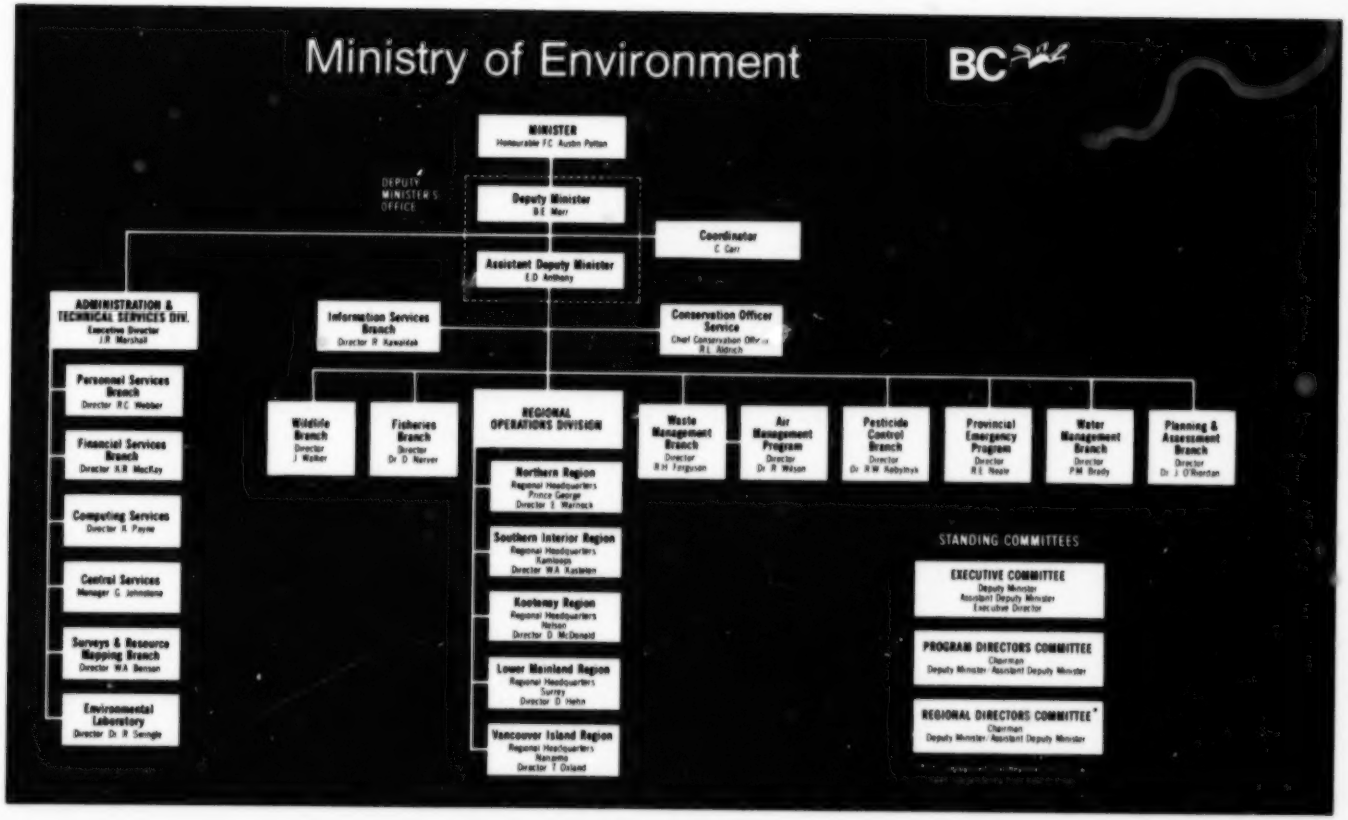
Ministry of Environment
BC
MINISTER
Honourable F.C. Austin Pelton
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Coordinator
C. Carr
Assistant Deputy Minister
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Kootenay Region
Regional Headquarters
Nelson
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Regional Headquarters
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Director D. Hahn
Vancouver Island Region
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Dr. J. O'Riordan
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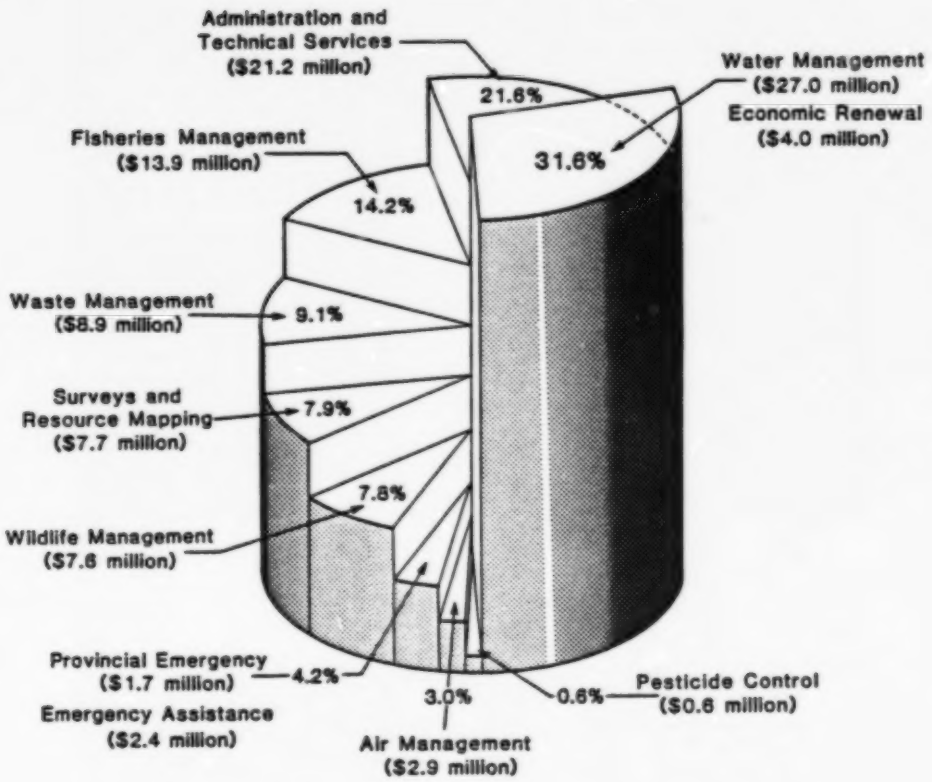
Assistant Deputy Minister
Executive Director
PROGRAM DIRECTORS COMMITTEE
Chairman
Deputy Minister- Assistant Deputy Minister
REGIONAL DIRECTORS COMMITTEE*
Chairman
Deputy Minister- Assistant Deputy Minister

Ministry Budget $98.0 million



Ministry of Environment: 1985–1986 Budget

Deputy Minister's Summary

This annual report documents the work of the Ministry of Environment during the fiscal year ending March 31, 1986.

The mandate of the ministry is to maintain an optimum quality environment through the management and protection of the land, water, air and living resources of the province.

During the period covered by this report, the ministry discharged this responsibility through management activities in the following program areas: water resources, air quality, freshwater sport fisheries and marine resources, wildlife, waste management, pesticide control, surveys and resource mapping, and technical and administrative services including environmental assessment and planning, operation of the provincial environmental laboratory, and the enforcement activities of the Conservation Officer Service.

These programs were delivered by approximately 1,400 full-time staff operating out of Victoria headquarters, five regional offices, three sub-regional offices, and numerous other centres across the province.

Significant accomplishments were achieved in all program areas during the year. Among the highlights was the signing of agreements with the federal government providing for long-term monitoring of water quality trends throughout the province as well as extension of the Fraser River Flood Control Program, which increased the funding available for this program by $41 million. Other cooperative ventures affecting the Water Management Program included the agreement with the State of Washington to replace the Zosel Dam and numerous river protection projects undertaken in conjunction with landowners and local governments.

Concern for air quality in British Columbia was reflected in a doubling of the number of air quality monitoring locations over the previous year, the establishment of an ozone control strategy in the Lower Mainland, and the continuing development of air quality criteria and objectives for a variety of potential pollutants and areas of the province. Agreements on acid rain with the other western provinces and Washington State were concluded in order to promote the sharing of data and to identify control strategies.

The Waste Management Program saw significant advances made during the year with the development of Waste Management Plans which will provide long-term benefits to the communities concerned. The commitment of over $20 million in special funding to the Okanagan Water Quality Control Project is expected to result in substantial improvement to the quality of lake water in the area. Major steps were also achieved in the area of environmental safety with the completion of a special waste storage system comprising eight regional storage facilities, together with the development of improved preparedness for dealing with emergency spills.

Environmental safety and public health concerns were also addressed through the Pesticide Control Program in response to the steadily rising demand for pesticide training and technical information on the safe use of pesticide products.

The Provincial Emergency Program continued to carry out its leadership role of ensuring that British Columbia communities are prepared to deal with potential disasters of all kinds, and maintained a close liaison with local and federal governments, police, industry, and the many volunteers who lend their time and assistance to emergency operations.

The Fisheries Program conducted a diverse range of activities in discharging its broad conservation and management responsibilities. Recreational fishing continued to put intense pressure on freshwater fish stocks. This demand was addressed through a combination of habitat projects, increased hatchery production and conservation-oriented angling regulations. A General Fisheries Agreement was signed during the year with the federal government, with the goal of increased cooperation and planning between fisheries management agencies. Rapid growth in British Columbia's mariculture industry resulted in a dramatic increase in the number of marine fish-farming operations and in shellfish production, which intensified the demands on the expertise of ministry staff.

Wildlife management activities were assisted by improvements in the database system implemented in the previous fiscal year, and by support received through the Habitat Conservation Fund. These projects reflected the continuing demand for high quality wildlife-related recreation, the growing awareness of the economic value of wildlife to the province, and the importance of maintaining the natural diversity of wildlife species.

To maintain a high standard of service to the province in all these areas, the ministry continued to work in close consultation with industry, other government agencies, and concerned citizens throughout the province. The resulting achievements are described in detail in the pages that follow.

Programs

Fisheries Management

Wildlife Management

Water Management

Air Management

Waste Management

Pesticide Control

Provincial Emergency

Surveys and Resource Mapping

Administration and Technical Services

Fisheries Management Program

The goal of the Fisheries Management Program is to provide social and economic benefits to the province of British Columbia through conservation and management of freshwater fisheries, marine resources, and associated habitats. Consistent with that goal are three objectives:

1. to maintain and enhance habitats which support natural and cultured populations of fish, shellfish, and marine plants;
2. to provide abundant and diversified recreational opportunities while protecting desirable populations of wild fish and oysters; and
3. to support and regulate commercial uses of fish, shellfish, and marine plants by encouraging and providing technical support to the aquaculture industry while providing quality control and consumer protection for fish and fish products handled or processed in British Columbia.

Legislation Administered

Fisheries Act (Canada) and Regulations
Wildlife Act and Regulations
Fisheries Act (B.C.) and Regulations
Fish Inspection Act and Regulations

Recreational Fisheries

Inland Fisheries Management

Inland fisheries management is directed toward protecting and improving resident (non-anadromous) sport fish populations to meet angler demands. In the 1985/86 sportfishing season, almost 283,000 resident and 77,000 nonresident freshwater angling licences were sold. In addition, over 27,000 steelhead and 1,700 special waters licences were sold. Based on information collected in the 1985 National Survey of Sport Fishing, 104,450 juveniles, who are not required to buy an angling licence, also fished. Special lakes and special river licences were replaced this year by a special waters licence. This intense demand for angling in British Columbia emphasizes the need to protect, maintain, and improve native fish stocks by protecting, restoring and enhancing fish habitat, introducing hatchery fish, and applying angling regulations to conserve fish stocks.

The annual stocking of lakes with fry, fingerlings, and catchable-size rainbow trout is a major function of the six provincial hatcheries. In 1985, 545 lakes and streams were stocked with 8.1 million rainbow, cutthroat, steelhead, brook trout, and kokanee. In addition, 3.7 million kokanee eggs were planted. A total of 22 million eggs were collected for future stocking programs. Reduced staffing resulted in the contracting of Peace Canyon Hatchery in 1985. Fish culture research projects involved the development of a water cooling system for adult holding and brown trout incubation, and diet formulation for manipulation of hatchery fish growth.

IHN virus (Infectious Hematopoietic Necrosis) is an acute viral disease of sockeye and chinook salmon and rainbow and steelhead trout which can cause high mortalities in fry and fingerling trout. In the fall of 1985 the virus was detected in adult kokanee used for egg collections at Kootenay Hatchery. Modifications were planned for Kootenay Hatchery to prevent infestation of the hatchery by birds or fish. At Summerland Hatchery, all fish were destroyed and safely disposed of in January 1986, when rainbow trout were diagnosed as having IHN. The entire hatchery was disinfected and put back in operation.

The number and variety of fish habitat-related enhancement and restoration projects grew in 1985, most being funded by the $3.00 surcharge on angling licences administered through the Habitat Conservation Fund. Debris removal and habitat improvement in streams remained an important component of inland fisheries enhancement. Further gravel additions to Bridge Creek resulted in over 1,000 square metres of new spawning habitat for Bridge Lake rainbow trout. The introduction of 96 cubic metres of spawning gravel to Minton Creek, tributary of Fletcher Lake, was completed in April 1986, in association with Ducks Unlimited. Further cleaning of spawning gravels in the Little Horsefly River resulted in 15,000 kokanee using 13,000 square metres of restored habitat. The improvement of kokanee shoal spawning habitat at Kokanee Bay on Lac La Hache was completed in 1985. Sand and silt were removed from an estimated 1,000 square metres of spawning substrate during the past three years. In the Omineca, major stream habitat improvement for rainbow trout was initiated in Corkscrew Creek, a productive tributary to Nulki Lake, near Vanderhoof.

In the Thompson-Nicola, a diversified program was begun to restore spawning habitat in upper

Loon Creek, an important source of recruitment for rainbow trout to the provincially recognized Loon Lake fishery. In addition to stream clearance, bank stabilization, and gravel additions, the construction of streamside fencing was completed to prevent intrusion of livestock into this stream. Another type of fencing was used in association with other Thompson-Nicola lakes. In Roche and Niskonlith lakes, steel fences were placed across lake outlets and in Community Lake a steel cage was built around an irrigation intake pipe to prevent loss of adult fish.

A number of smaller-scale stream habitat improvement projects were conducted in association with Skeena lakes. An innovative project was implemented in Round Lake, near Smithers. A pad of lakeshore spawning gravel was laid over perforated pipe through which oxygenated water will be pumped to attract rainbow trout spawners and, hopefully, provide recruitment of fry.

Another innovative undertaking was the diversion of Clearwater Creek in the McNaughton (Mica) Reservoir drainage, near Golden. This stream, which entered Blackwater Lake, was responsible for siltation of spawning habitat at the lake's outlet. This has been remedied by diverting the stream from the lake to a point further down the outlet stream. Another diversion project, involving 1,200 metres of eight-inch pipe, was completed at Isabel Lake, near Kamloops. The objective was to divert a portion of the well-oxygenated waters of Dairy Creek into the lake to prevent winterkill of fish. Restoration work was also conducted on a similar diversion at Salmon Lake, in the Thompson-Nicola. Lastly, a diversion of a different nature was constructed in the Nithi River between Borel and Francois lakes, in the Skeena region. A new channel was provided around a major log jam that was preventing utilization of extensive spawning habitat located downstream. An estimated 500 rainbow trout spawners were observed after the work in 1985, a tenfold increase over 1984.

The number of projects in the area of applied research also grew in 1985. A test to assess the use of agricultural grade fertilizers to increase production in small coastal lakes was commenced in Salsbury Lake, near Mission, in the Lower Mainland. A marked response in chlorophyll production was observed in 1985, and the project will be continued for at least three years to evaluate ultimate benefits in terms of fish production. At Till Lake, near Williams Lake, a second year's release of sterilized coho was conducted in an effort to control chub, a competitive coarse fish. Experimental netting indicated coho released in May 1984 had grown considerably and were predating on chub. It is hoped that this test project may provide a biological tool for the control of coarse fish in some gamefish lakes.

Chemical rehabilitation with biodegradable rotenone remains the main method of coarse fish control. Treatments were undertaken at Holstein Lake in the Okanagan, and Champion Lakes near Trail. Detailed planning was completed on the outlet streams of Summit and Kiakho lakes, in the Kootenays. These lakes are scheduled for tretment in 1986. Lake aeration was a major commitment on Vancouver Island. After technical difficulties in 1984, a massive bottom water (hypolimnetic) aeration system in St. Mary Lake, on Saltspring Island, is operational. A similar type aeration system in Glen Lake came on line in 1985 and is already resulting in increased catch and success. Evaluation of a total water body (destratification) aeration system on Langford Lake, installed in 1984, also indicated increased catch of sport fish and improved angling success.

Work was continued on two major kokanee spawning channels associated with Kootenay Lake. In the third year of a four-year project to renovate the Meadow Creek spawning channel, an evaluation fence and diversion barrier were constructed and operated. The fry production was estimated at 7.2 million, and the 38 per cent egg-to-fry survival rate was the second highest recorded in 20 years. A channel at Kokanee Creek, tributary to the West Arm of Kootenay Lake, had a settling pond and water intake installed. The placement of spawning gravels and regulation of flow will result in improved fish production in 1986, as well as providing a public education site in Kokanee Creek Provincial Park.

Hill Creek spawning channel has been operating since 1982 to enhance Arrow Lake kokanee, rainbow, and Dolly Varden stocks. The first returns of enhanced kokanee appeared in 1985 with a spawning run of 100,000 fish compared to 10,000 prior to channel construction.

A study of lower Fraser River sturgeon commenced in 1985, with the introduction of an angling permit system to determine the number of sturgeon anglers, effort, and harvest. With cooperation from the Salmon Commission, Malaspina College, and anglers, 800 sturgeon were tagged with disk tags in 1985. A radio telemetry program is also underway to monitor their migration.

Aerial surveys of lakes in the Vancouver Island, Lower Mainland, Okanagan, and Omineca regions were conducted throughout the 1985 fishing season to determine angler use. Over 130 lakes in the Lower Mainland region were flown over nine times throughout the fishing season. The success of this technique in surveying anglers will be known within one or two years and will

assist fisheries biologists in making informed management decisions.

The Vancouver Island lake management team coordinated two public involvement projects: the construction of two fishing piers in lakes in the Victoria area undertaken by the area Kinsmen Club, and a lake habitat improvement project carried out by the Lake Cowichan Fish and Game Club. Work is continuing on these projects.

The number of freshwater Commercial Fish Culture permits issued to fish farmers and research laboratories to culture rainbow trout, common carp, Pacific salmon and/or Atlantic salmon increased from 148 in 1984/85 to 171 this year. Thirty-nine Nontidal Net Fishing licences were issued in the 1985 calendar year for the commercial or domestic harvest of crayfish, coarse fish (carp, suckers, squawfish, chub) and game fish (lake trout, whitefish, burbot, pike, walleye). The federal/provincial Transplant Committee during 1985/86 reviewed 552 applications to transplant live fish or aquatic invertebrates in the province, of which 151 received conditional approval, 392 were approved without conditions, and nine were refused.

Anadromous Fisheries Management

Since 1977, the province's role in the Salmonid Enhancement Program (SEP) has been to protect and enhance stocks of steelhead an anadromous cutthroat trout. Eight years of SEP funding has resulted in a greatly increased knowledge of these fish stocks.

Steelhead stocks are harvested by a number of fisheries, including a high-seas gillnet fishery, several different inshore commercial fisheries, native food fisheries, and the sport fishery. Monitoring run strength for these stocks is an important activity in the fisheries program and is accomplished by snorkel and creel surveys, catch analysis, and juvenile abundance surveys. These data guide the regulation of the sport fishery and serve as the basis for negotiations with the federal Department of Fisheries and Oceans and native groups.

Enhancement of selected stocks of steelhead and cutthroat trout reared in federal, provincial and public hatcheries continued. Loon Creek Hatchery will cease to rear steelhead trout and chinook salmon in 1986 to allow more room for the culture of inland trout stocks. Rather, Thompson area steelhead will be raised on contract at Spius Creek Hatchery. Steelhead releases in 1985 consisted of 1.8 million fry and 850,000 smolts to 56 waters in the province. In addition, over 100,000 sea-run cutthroat trout smolts were released in 23 streams. The success of the steelhead stocking program is reflected in substantial hatchery adult returns to many rivers in the last few years. Hatchery steelhead made up almost 20 per cent of the total provincial steelhead catch during the 1984/85 fishing season.

The cutthroat program, however, continues to present problems, particularly in the regulation of the fishery and the poor survival of hatchery releases. Sea-run cutthroat stocks are probably much more fragile than steelhead. Their habitats (small streams) are easily and frequently damaged by land use activities and they are easily overfished. Juvenile cutthroat are often competing with other fish species, particularly young coho salmon. Enhancement efforts have had limited success and stocks remain at risk. An exception is the Oyster River cutthroat stocking program, which has generated a new fishery supporting approximately 2,000 angler days.

Essential to the management of steelhead and sea-run cutthroat are habitat protection, harvest regulations, fish culture and habitat improvement. Severe reductions in daily and annual catch limits, combined with favorable environmental conditions, have resulted in many river systems reaching or exceeding historical levels of abundance of steelhead. Evaluation in the Lower Mainland during 1985 showed increased jurvenile steelhead stocks in all study streams. Juvenile stock monitoring on Skeena summer-run systems in 1985 also showed high densities of steelhead. The Kispiox River had the highest juvenile fry population in over six years of sampling. Fry and parr densities sampled on the Chilko-Chilcotin River were also at capacity.

The outlook for these streams should be larger adult returns in four to five years. However, it must be noted that in the future, poor ocean conditions, combined with high commercial and native harvest rates, could change present run predictions. It is currently estimated that 50 per cent of Skeena summer-run steelhead are intercepted in the commercial sockeye fishery at the Skeena River mouth.

Creel surveys continued for steelhead on the Silverhope, Vedder, Thompson, and Dean rivers and for sea-run cutthroat trout in numerous Lower Mainland streams. Cutthroat angler use and catch surveys conducted over the past five years indicate that, in selected areas, hatchery cutthroat contribute strongly to the anglers' catch.

Plans are being implemented to incubate and rear Skeena steelhead in northern SEP hatchery facilities and eliminate the need to culture these fish at the distant Fraser Valley Trout Hatchery. The first hatchery adult returns of Kitimat River steelhead produced at Kitimat Hatchery are ex-

pected in 1986. Searun cutthroat are also being cultured at Kitimat. As of this year, steelhead are also being reared at Toboggan Creek, Kispiox and Deep Creek hatcheries.

Habitat protection and restoration remains an important priority for wild stocks since 75 per cent of fish production is from natural habitat. A diversion screen was designed for the Salmon River, on Vancouver Island, with completion expected in September 1986. This will allow the passage of steelhead trout and coho and chinook salmon into several kilometres of river above the B.C. Hydro diversion and will increase steelhead habitat by 50 per cent. Work continued on the Deaman River, in the Thompson region, to protect streamside habitat through fencing to eliminate damage caused by livestock and tree planting to stabilize the stream bank. Major projects for which mitigation agreement was achieved were the Coquihalla Highway and CNR twin tracking. There were also many mitigation negotiations that took place at the field level, many related to the forest industry, which are individually of small scale but cumulatively significant.

Research continued in the areas of stream fertilization, monitoring of steelhead ocean survival, stock assessment, and computer modelling tehniques.

Habitat Management

Habitat Protection

Fish habitat protection efforts in 1985 concentrated on aspects of forestry, low stream flows, major developments such as Alcan's regulation of the Nechako River, pesticide referrals, the Coquihalla Highway construction, and mining activities.

A major initiative was the signing of the federal/provincial Fisheries Agreement and the subsequent formation of a formal federal/provincial Habitat Management Committee. This committee approach with the Department of Fisheries and Oceans addresses problems of mutual concern and develops solutions in the fisheries protection and inventory fields.

Most natural fish habitat occurs on forest land and, therefore, the activities of the forest sector are of vital interest and concern to the fisheries program. Not only has timber production been at record levels in recent years, but also the Forests ministry has been very active in forest protection, basic forestry, backlog planting and intensive forestry. All these activities can have some impact on habitat, and considerable inter-ministry effort has gone into maintaining and improving the referral system. Specific issues that were addressed include the Forest Resource Development Agreement, Emergency Bark Beetle Program, Tree Farm Licence Management and Working Plans, Pre-Harvest Stand Prescriptions, and Access Planning.

Always the habitat protection objective has been to identify and solve problems before, not after, they occur. Other agencies continue to respond positively to Ministry of Environment initiatives for improving integrated resource management on the Crown forest lands of British Columbia.

One initiative that the Fisheries Branch has been actively involved in during the past two years is the development of the Fish/Forestry Guidelines. These guidelines are designed to prevent forest development damage to fish habitat and they have been developed with cooperation of the Department of Fisheries and Oceans, Ministry of Forests and the forest industry. However, these guidelines have yet to be accepted by the forest industry.

The workload continued to increase as a result of the intensified activity in silviculture on Crown forest lands. In 1985, there were more than 700 applications for herbicide use, up from 555 in 1984. Efficiencies in processing permits were made with the application of computers to file and store information, and to prepare ministry response letters. Steps were taken to introduce monitoring procedures to evaluate compliance with permit conditions.

Habitat Inventory

New initiatives in fish habitat inventory took place under the umbrella of the federal/provincial Inventory Agreement. Significant progress was made toward the development of a cooperative fisheries inventory database that can be accessed by both agencies. Other initiatives under the agreement include the development of coastal zone inventory mapping methodologies, testing of stream inventory recording methods and feasibility of computer mapping techniques.

The Inventory Operations sub-unit conducted reconnaisance level surveys of 78 lake/stream systems. Fifty-four per cent of these were located in the Skeena, Omineca and Peace sub-regions. eleven lakes of this total were special surveys conducted to complement the Parks and Outdoor Recreation Division planning processes with a further twelve done in cooperation with the Department of Fisheries and Oceans to consider present and potential use by migratory fish stocks.

Marine Resources

This section is responsible for the development and management of the mariculture industry and the fish processing sector in British Columbia. The section provides a range of technical and administrative services to these industries under authority of the Provincial Fish Inspection and Fisheries Acts.

Inspection, Licensing and Enforcement Unit

The total number of fish processing companies licensed in 1985 increased to 191 from 186 in 1984. The number of decals issued for processing general categories of species increased from 403 to 414. However, the number of fish buying licences issued decreased from 417 in 1984 to 367 in 1985. Fishermen's vending licences also decreased, from 272 to 240.

Provincial fish inspectors once again concentrated a large amount of effort on illegal fish buying activities, particularly in regard to salmon. Fish sales to the general public, illegal sales of bivalves and shellfish that had not been inspected, along with inspections of fish processing and buying facilities occupied the balance of time and resources.

Finfish Policy and Development

More than 196,000 tonnes of fish were landed in British Columbia in 1985, at a value of $375 million. More than 100,000 tonnes of salmon, worth $245 million, were landed — an all time record for British Columbia. The wholesale value of British Columbia seafood was also the highest ever recorded, totaling more than $723 million. The wholesale value of salmon was $512 million, while herring exceeded $103 million.

As of December 31, 1985, staff had approved 92 marine fish farm sites. An estimated 40 sites were in operation by the end of 1985, up from 11 at the end of 1984. The 34 leased/licensed sites occupied a total area of over 108 hectares. In 1985, 129 Salmon Farm Management Plans were accepted for review and 65 were approved. Dramatic growth of the salmon farming industry is expected to continue and reflects the economic potential and broad appeal of fish farming to new investors. The flood of Management Plans and land referrals placed a heavy burden on a reduced staff complement.

Funds were allocated to partially support an initiative by the B.C. Salmon Farmers Association to improve husbandry practices for commercial salmon broodstocks so that egg production and survival will be enhanced to meet the ever-growing demand.

Staff expertise was devoted to technical analysis of a program aimed at screening chinook salmon stocks from six separate rivers for use as commercial broodstock. This program is based on chinook smolts made available by the Department of Fisheries and Oceans and financial support offered by the Ministry of Agriculture and Food. Smolts from each of the stocks were supplied to commercial farm sites to be grown under standard husbandry protocols.

Shellfish Management and Development

As of December 31, 1985, 188 shellfish growers were registered. This represents an increase of 12 per cent over 1984. The total number of land tenures recorded for shellfish culture were 334 at year's end. There were 40 additional and 17 cancellations. The total area for shellfish culture as of the end of 1985 was 1,412 hectares, an increase of 2 per cent over 1984. Tenures surveyed for diligent use in 1985 totalled 210.

Oyster production in 1985 increased by 57 per cent from 1,897 to 3,343 tonnes. Landed value increased from $2,109,000 to $2,599,000 (up 23 per cent) while wholesale value increased from $2,483,000 to $2,966,000 (up 19 per cent).

In response to industry interest for alternatives to deepwater longline culture, an oyster raft project was initiated on a commercial lease in Nanoose Bay. Fisheries Branch engineering staff designed a flexible 16 x 20 foot raft capable of withstanding significant wave action. Deepwater culture of oysters utilizing rafts, while more capital intensive, is 2 to 3 times more efficient in terms of space utilization, allowing more oysters to be produced from a smaller area. As well, a solid raft structure provides a working platform for maintenance of oysters. These rafts will be used next year to carry out a detailed fouling study to assess the effects of fouling on oyster growth and mortality.

The oyster broodstock program is continuing with monitoring of growth and survival of selected offspring. While initial work was aimed at developing stocks of oysters which have superior growth rates and meat yields, improved disease resistance may become more important given current industry trends.

The joint federal/provincial commercial scallop culture project is continuing at the Pacific Biological Station. Large scale post-set mortalities continue to be of major concern. Emphasis is still being placed on the dietary aspects of larval

health. Approximately 1,000 first generation Japanese scallops are on hand and may be used as broodstock at maturation.

A joint provincial/federal project to assess the incidence and geophysical distribution of diseases and parasites in vivalves — principally oysters and clams — was initiated with Pacific Biological Station staff. This project also provides certification for exported products to the United States.

Pre-impact studies are nearing completion in Trevenen Bay where high density off-bottom oyster culture is scheduled to take place. Monitoring will continue as the culture of oysters in the bay increased towards projected levels. Oyster growth and condition measurements, sediment analysis, and physical oceanographic studies at control and impact sites are expected to exhibit changes. Problems arising as a result of development will be documented.

NONRESIDENT ANGLING LICENCE SALES 1983/84 TO 1985/86
(not including Habitat Conservation Fund impost fees)

	1983/84		1984/85		1985/86	
	Number	Value	Number	Value	Number	Value
Canadian Resident (Annual)	37,033	444,396	24,998	299,976	21,649	259,788
Canadian Resident (Short-term)	N.A.	N.A.	14,466	72,330	17,181	85,905
Nonresident (Annual)	12,052	241,040	11,992	239,840	12,853	257,060
Nonresident (Short-term)	28,529	285,290	27,120	244,080	25,517	229,653
Canadian/Nonresident Steelhead	2,218	33,270	2,663	39,945	3,308	49,620
Special Lakes	781	11,715	707	10,605	N.A.	N.A.
Special Rivers	1,227	30,675	1,409	35,225	N.A.	N.A.
Special Waters	N.A.	N.A.	N.A.	N.A.	1,680	42,000
Total	81,840	1,046,386	83,355	942,001	82,188	924,026

RESIDENT ANGLING LICENCE SALES 1983/84 TO 1985/86
(not including Habitat Conservation Fund impost fees)

	1983/84		1984/85		1985/86	
	Number	Value	Number	Value	Number	Value
B.C. Resident (Annual)	269,133	2,691,300	260,444	2,604,440	244,247	2,442,470
B.C. Resident (Short-term)	N.A.	N.A.	3,428	13,712	6,101	24,404
Senior Citizen	30,538	30,538	31,766	31,766	32,591	32,591
Steelhead	17,895	107,370	22,466	134,796	24,377	146,262
Total	317,566	2,829,238	318,104	2,784,714	307,316	2,645,727

Wildlife Management Program

The goal of the Wildlife Management Program is to maintain the diversity and self-sustaining ability of species representative of the major biophysical zones of the province, and to ensure that within the constraints of land capability and the biological limits of each species, wildlife is available in sufficient abundance to meet the aesthetic, cultural, recreational, ecological and economic needs of society.

Consistent with that goal, the objectives of the Wildlife Management Program are:

1. to maintain the natural diversity of wildlife species.
2. to maintain the natural diversity of wildlife habitat by minimizing the deleterious effects of man's activity, and to secure and enhance habitats, consistent with the ministry's objectives for wildlife production and the public's demand for wildlife.
3. to provide for public education and information relating to the wildlife program, the value of wildlife, and opportunities for wildlife use and public involvement in its management.
4. to manage wildlife populations to provide for consumptive and non-consumptive use of wildlife consistent with program plans.
5. to minimize danger to life and damage to property caused by wildlife.
6. to promote the maintenance of existing commercial uses of wildlife such as trapping and guiding, and to attempt to develop compatible new uses.

Legislation Administered

Wildlife Act and Regulations

Migratory Birds Convention Act and Regulations (Canada)

Game Export Act (Canada)

Birds, Endangered Species and Non-Game Wildlife

Further inventory work was carried out on the Vancouver Island marmot, culminating in publication of a status report and management plan. Ten adult and 41 young burrowing owls were transplanted to the Okanagan from Washington State in an effort to re-establish the species in B.C.

Field work and a report on the Pacific giant salamander were completed in co-operation with the World Wildlife Fund Canada. Additional field investigations were done on the sharp-tailed snake.

Field work was carried out on the spotted owl in order to determine its occurrence and density in southwestern B.C.

Transplants of Canada geese from the Okanagan to the Central Interior were continued, to enhance goose numbers in the Chilcotin and lessen goose conflicts with civic parks and agricultural crops in the Okanagan.

Nine permanently crippled bald eagles were sent to the Patuxent Wildlife Research Centre in Maryland to assist in captive breeding. Any young produced will be released to the wild in the U.S. to augment populations that have been depleted.

Ninety-four young pelicans were banded at the Stum Lake colony in August, the second highest number of young ever recorded for that population.

Papers published:

Farr, A.C.M. **Status Report on the Pacific Giant Salamander (Dicamptodon ensatus) in Canada.** Report commissioned by Ministry of Environment and World Wildlife Fund for the Committee on the Status of Endangered Wildlife in Canada. 1985. 60pp. W.T. Munro, D.W. Janz, V. Heinsalu and G.W. Smith.

The Vancouver Island Marmot: Status and Management Plan. Nov. 1985, Ministry of Environment, Wildlife Bulletin B-39 23pp.

Ungulate Management

Transplants of elk, caribou, mountain goat and bighorn sheep were made in several areas of the province to re-establish or supplement populations. An elk transplant was made in the Trent River area, caribou transplants to McClinchy Creek and Mt. Kappan. California and Rocky Mountain bighorns were transplanted to several sites. Mountain goats were transplanted in the Okanagan sub-region.

The Ungulate Inventory Data Base has been placed on the ministry computer and is now operational. To date 79 surveys have been entered (63 classification, 6 total count, 5 linear transect, and 5 sample block surveys).

Twenty-seven inventory reports were completed for 1985/86 (7 deer, 2 moose, 2 caribou, 11 mountian goat, and 5 sheep).

The deer harvest was down, particularly on Vancouver Island, where wolf predation has been

high. The moose take increased slightly over the previous two years but is still much below the highs of the mid-1960's. The elk harvest was down slightly from the high of 1983. The hunter harvests of mountain goat, bighorn sheep, and caribou were about average.

Carnivore and Problem Wildlife Management

Wolf Management

Wolf population reduction was suspended for the 1986/87 winter in northeastern British Columbia, following signs of strong recovery in moose and mountain sheep survival. A continuation of the program will be considered if prey populations show signs of decline and wolf recovery indicates excessive predator pressure.

On northern Vancouver Island deer population recovery continued where wolf population reduction was maintained during the 1986/87 winter. Concern has been expressed over the high wolf population level on southern and central Vancouver Island.

Problem Wildlife Management

Progress has been made to lessen wolf-related livestock losses in the Central Interior by site-specific trapping and poison baiting. There was a decline in bear problems in the province, although there were two fatal incidents with black bear during the year. Two cougar attacks on children on Vancouver Island resulted in serious injuries.

While concern for agricultural damage caused by wild ungulates and waterfowl remained high, actual damage levels were low to moderate during the year.

Guided Hunter Activity

During the 1985/86 hunting season 3,951 big game hunters were guided by British Columbia's guide outfitters. Of this total, 66 were resident hunters, 118 were non-resident Canadian hunters, and 3,767 were non-resident alien hunters.

The 268 active guide outfitters employed 892 assistant guides, plus a good number of wranglers, cooks and expediters.

Most hunters came from the United States (3,334 or 84 per cent). Nineteen other countries and ten Canadian provinces were represented in the total number of hunters. The 3,951 hunters took 3,740 big game animals, a 10 per cent increase over the number killed in 1984/85.

Total direct revenue from non-resident licences, guide licences and royalties was $1,626,178.

Trapping

Approximately 300 students completed Trapper Education Program courses during the year.

British Columbia's raw fur industry produced an estimated $3.5 million worth of fur in the 1985/86 trapping season.

The Trapper Assistance Program has completed its fourth year. Thirty-five thousand dollars was allocated in 1985 to help trappers obtain more humane traps, and to aid in the search for better trapping systems in cooperation with the Fur Institute of Canada. The Minister's Trapping Advisory Committee administers the fund and recommends humane trapping regulation changes.

Total direct government revenue from trapping through licence sales and fur royalties was $108,525.

Biometrics

Summary Statistics Data Base

The Summary Statistics Data Base, an integration of several major provincial data systems which acquire and process hunter effort and animal mortality information, was implemented in 1984/85. The Wildlife Branch has continued to enhance this data base during the 1985/86 fiscal year. The ministry's computer communication network allows regional staff immediate access to the data base, providing historical information back to 1976 for trend analysis, and current data for ongoing management activities. The Summary Statistics Data Base is updated frequently during the year to ensure that the latest animal mortality and hunter effort data are available to wildlife managers. Continued enhancements are planned in the future to provide access to additional information, including hunting regulations, weather, and economic values.

Ungulate Inventory Data Base

A companion information source for wildlife managers, the Ungulate Inventory Data Base, was developed and implemented. This data base, utilizing the Summary Statistics format, allows regional wildlife managers to record, analyze and report ungulate inventories undertaken in their regions. The initial release of this system is now being accessed by staff. Plans to enhance this system, including more detailed reporting facili-

ties and linkage to the Summary Statistics Data Base, are being prepared.

The Wildife Branch is continuing its work toward developing and integrating existing computerized data bases for habitat information.

Tooth Return Program

The "Tooth For the Truth" program (ungulate tooth returns by successful hunters) received a total of 7,000 deer, moose and elk teeth from cooperating sportsmen. Respondents received, by return post, the age of their animal, plus a unique jacket crest as a token of appreciation for their assistance.

BL.E.H. Computer System

The 1985 Limited Entry Hunting Draw computer system for fall hunts handled 70,777 applications, assigning 19,503 authorizations for 8 species of animals in 62 areas involving 554 hunts. The smaller Draw for Spring 1986 grizzly bear hunts in the Kootenays handled 1,238 applications for 317 authorizations. The Limited Entry system also incorporates a mail questionnaire to all deer, moose and elk hunters following each hunting season.

Hunter Number Program

The B.C. Resident Hunter Number system, incorporated in 1982, now has some 240,000 individual sportsmen recorded as eligible to hunt in British Columbia. It maintains a record of names, addresses and licences purchased each year and provides the linkage between several major wildlife harvest data systems.

Hunter Sample

The annual Hunter Sample questionnaire was mailed to some 80,000 sportsmen to determine their hunting activity and success during the 1985/86 hunting season. Response rates averaged 75 per cent. Estimates of harvest by B.C. resident hunters were produced for major big game, waterfowl and upland game bird species.

Compulsory Inspection

During the 1985/86 hunting season the Compulsory Inspection system handled some 2,300 individual reports of harvest of cougar, grizzly bear, mountain sheep, caribou and mountain goat throughout the province, and elk and wolf in some areas, by both resident and non-resident hunters. This program requires all hunters to report the harvest of these species to ensure complete data is available to support the intense management activities required in some areas.

Research and Development

Our research program was conducted and funded cooperatively with a variety of agencies, in both the government and private sectors. Among the participants were the ministeries of Forests and Lands, Parks, and Housing; the Spatsizi Association for Biological Research; several forest companies, including Doman's Forest Products Ltd; the U.S. Fish and Wildlife Service; and the Universities of British Columbia, Simon Fraser, Saskatchewan, and Victoria.

Integrated Wildlife/Intensive Forestry Research Program

The IWIFR Program completed its fifth year investigating the impact of intensive forestry on habitat needs of blacktail deer and Roosevelt elk on Vancouver Island. Activity focussed on data-analysis and writing up, with decreased emphasis on field work. A total of 10 reports were printed this year. A second five-year phase was officially approved. This past year showed increased interest by the forest industry in the possibilities of logging second growth stands to create winter range for blacktail deer.

Coastal Grizzly Project

The fourth year of the coastal grizzly project ended successfully, with a busy field season in the summer and intensive data analysis in the winter. Three years data shows that the Kimsquit river valley grizzlies, when out of their dens, spent about 30 per cent of their time in coniferous forests, 40 per cent in seral floodplain habitats, 20 per cent in high elevation habitats, and 2 per cent in logged areas. Grizzlies continued to avoid a corridor along the main haul road, but some indication of habituation appeared in the fall. Experimental removal of vegetative cover at a high use feeding site led to a decrease in use of the area by grizzlies. Further field studies of these aspects are planned for 1986/87.

Several technical papers were presented at the International Bear Biology meeting, and at a symposium on grizzly bear habitat classification and management.

Increased time was spent on developing products for transferring research results into useful tools for wildlife, habitat and forest managers.

Wildlife Habitat Handbook Project

This project aims at producing computer and written tools to help forest and wildlife managers assess the impacts of proposed forest develop-

ment on all classes of vertebrates. Progress made during 1985/86 included:

— completion of species notes to the camera-ready stage
— drafting a manuscript that describes habitat classes for the province
— completion of habitat suitability models for two species
— beginning a demonstration area in cooperation with a Kamloops-based forest company.

Inventory Methods for Caribou

The aim of the first phase of this long term project was to recommend reliable census methods for northern B.C. caribou herds, based on detailed radio telemetry studies of caribou in Spatsizi Provincial Park. Two comprehensive reports were completed to the camera-ready stage, one on the biology of Spatsizi caribou, and the second on inventory procedures. A project planning workshop was held, involving recognized experts on caribou, to help direct activities in the next phase of the study — the interactions of the large mammalian predators and prey in the study area (caribou, moose, Stone sheep, mountain goat, grizzly bear, and wolf).

Systematic Status of B.C. Wolves

This 1985 study had several major conclusions. B.C. wolves fall into two major groups: a large, northern type, and a smaller type occupying the coast and the northwestern United States. Two previously described types appear to be extinct. Hybridization between dogs and wolves probably occurs, at least on southern Vancouver Island, although to a very limited extent. It appears that wolves migrating from the mainland have diluted the original Island wolf to the extent that it is no longer distinguishable from the coastal mainland wolves. Recent wolves from southeastern B.C. and the northwestern U.S. are probably migrants from Canada, rather than remnant populations of the Northern Rocky Mountain wolf. Results of this research were written up as a Master's thesis at the University of Victoria and also presented at a meeting of the IUCN's Wolf Specialists Group.

Pathology of East Kootenay Bighorn Sheep

In the third year (1985/86) of this project, work was devoted to completing the extensive analyses of tissues, describing histological differences between sick and healthy bighorns, and beginning the write-up of the final report. Advice was provided to regional management staff regarding measures that could be used to help prevent possible die-offs.

Flathead Grizzly Project

The objective of this long-term project is to examine the habitat and population ecology of grizzly bears in the Flathead River drainage, in order to improve management of the species. Specific concerns relate to the impact of resource development on grizzlies and their habitat requirements, and on the impact of hunter harvest. Field work continued, but increased emphasis was placed on data-analysis and writing up, particularly regarding estimates of population size and home range areas, and on the the impact of human activity on habitat use.

Ecology of Southern and Central Interior Caribou

Four closely related research projects addressed this topic in 1985/86. In the Tweedsmuir Park area, radio-collared caribou are being monitored to identify migration routes and winter ranges, as inputs to planned timber harvest in winter habitat outside the park. In the Itchas-Ilgachuz-Rainbow Mountain area, radio-collared caribou are being surveyed to identify seasonal ranges and to monitor population dynamics. This herd appears to be increasing faster than other B.C. herds. Located in the Quesnel Highlands, the third project is using radio-telemetry to assess the impact of wolf predation on caribou, and to identify seasonal habitats of caribou. The fourth study is in Wells Gray Provincial Park, and is funded primarily by the Park Programs Branch. This study began in March when about 25 caribou were radio-collared to help determine annual movements of Park caribou, especially with respect to movements in and out of the Park and the interaction between caribou and recreational activities.

Nimpkish Valley Wolf/Deer Project

This project begin in 1982/83, with the objective of determining the impact of experimental wolf control on deer populations in the Nimpkish Valley, Vancouver Island. Results to date indicate significantly increased survival of deer in the wolf removal area compared to the non-removal area.

Research Needs for Habitat Enhancement

Initiated in 1985/86, this project's objective is to define research and development projects required to meet the needs of wildlife and habitat managers. A problem analysis is being conducted to document enhancement activities to date in the

province, describe problems and opportunities as seen by managers, assess the relevance of the existing literature, and identify how best to spend research time and money to meet management needs.

Technical Reports: 1985/86 Publications

R-6 **The breeding ecology and management of white pelicans at Stum Lake, British Columbia.** D.L. Dunbar. September 1984 (printed February 1986.) 85pp.

R-11 **Wildlife habitat handbooks for British Columbia:**
Standard taxonomic list and codes of amphibians, reptiles, birds and mammals. R.W. Campbell and A.P. Harcombe. March 1985. 86pp. (Also printed as WHR-20)

B-33 **Reliability of motion-sensitiveness and radio-collars for estimating activity of blacktail deer.** M.P. Gillingham and F.L. Bunnell. 1985. (IWIFR-14; printed in Journal of Wildlife Management. 1985. 49(4): 951-958.

B-34 **Deer movement and habitat use during winter: working plan.** J.B.Nyberg, D. Doyle, and L. Peterson. 1985 (Also printed as IWIFR-18)

B-36 **Comparison of methods for estimating forest overstory cover.** D.J.Vales and F.L. Bunnell. 1985. (Also printed as IWIFR-20)

B-37 **Vancouver Island Roosevelt elk/intensive forestry interactions: progress report 1981-1984.** J. Youds, K. Brunt, and D. Becker. 1985. (Also printed as IWIFR-21)

B-38 **Interactions between black-tailed deer and intensive forest management: problem analysis.** R.S. McNay and R. Davies. 1985. (Also printed as IWIFR-22)

B-39 **The Vancouver Island marmot: status and management plan.** W.T. Munro, D.W. Janz, V. Heinsalu, and G.W. Smith. November 1985. 23pp.

B-40 **Effects of intensive forest management on amphibians and reptiles of Vancouver Island: problem analysis.** K.L. Sadoway. 1985. (Also printed as IWIFR-23)

B-41 **Effects of intensive forest management on non-ungulate mammals of Vancouver Island: problem analysis.** K.L. Sadoway. 1985. (Also printed as IWIFR-24)

B-42 **Effects of intensive forest management of breeding birds of Vancouver Island: problem analysis.** K.L. Sadoway. 1985. (Also printed as IWIFR-24)

B-43 **Enhancing the establishment and growth of arboreal forage lichens in intensively managed forests: problem analysis.** S.K. Stevenson. 1985. (Also printed as IWIFR-26)

B-44 **Managing young forests as black-tailed deer winter range.** J.B. Nyberg. 1986. (Also printed as IWIFR-27)

WR-13 **Kechika Enhancement Project of northeastern B.C.: wolf/ungulate management.** 1984/85 annual report. J.P. Elliott. September 1985. 28pp.

WR-14 **Muskwa Wolf Management Project of northeastern B.C.** 1984-85 annual report. J.P. Elliott. September 1985. 44pp.

WR-16 **Working plan - coastal grizzly research project.** W.R. Archibald and A.M. Hamilton. October 1985. 27pp. (Also printed as WHR-21)

WR-17 **Progress report - year 3 - 1984, working plan - year 4 - 1985. Coastal grizzly research project.** W.R. Archibald, A.N. Hamilton, and E. Lofroth. October 1985. October 1985. 65pp. (Also printed as WHR-22).

Habitat Management

The Habitat Management Section performs four major functions: 1) habitat protection, 2) land use, 3) planning, and 4) fund administration.

Habitat Protection

Regional staff processed approximately 16,000 referrals, and conducted many field inspections of development proposals having potential to impact wildlife habitat. Negotiations with developers and reviews of site plans were undertaken. Recommendations were made to reduce the impact of developments on wildlife and its habitat.

The existing habitat referral system was documented in preparation for computerization of the system.

Forestry

Forestry issues affecting wildlife habitat that were addressed included the Forest Resources Development Agreement, the Tree Farm Licence Subsidiary Agreement, forest pesticide use, Timber Supply Area planning, the Emergency Bark Beetle Program, silvicultural referrals, and coordinated access management. Comments were provided on Ministry of Forests draft policies affecting wildlife, such as forage seeding.

An information brochure on wildlife trees was co-produced with the Canadian Wildlife Service and Simon Fraser University.

Mining

The Habitat Management Section reviewed environmental impact reports for a number of metal and coal mine proposals under the Mine Development Review Process. Recommendations were provided to reduce effects of mine developments on wildlife.

Highways

Wildlife vehicle collisions were monitored. Reports indicate that more than 3,000 animals per year are killed on highways, representing vehicle damage costs of nearly $5 million. A preliminary study evaluating the effectiveness of ultra-sonic wildlife warning devices was completed.

The Habitat Management Section was involved in developing strategies to reduce the impact of the Coquihalla Highway on wildlife and its habitat.

Land Use

A discussion paper on Wildlife Management Areas was circulated to other provincial agencies for comment.

Habitat Management staff participated in the inter-agency liaison committee established to review "The Wilderness Mosaic," prepared by the Wilderness Advisory Committee. The section also coordinated the branch review of this report.

Appraisals and negotiations for land acquisition activities within the Ministry were undertaken by the section.

Contracts with The Nature Trust and Ducks Unlimited were developed, and a number of joint land use projects were administered by the section.

A Wildlife Land Committee, consisting of The Nature Trust, Wildlife Habitat Canada, Ducks Unlimited, and the Habitat Management Section, was established to coordinate the activities of agencies purchasing habitat for conservation purposes.

Planning

The Habitat Management Section was assigned the role of coordinating the Regional Wildlife Plans. These plans consist of a wildlife component and a habitat component.

Development of a Provincial Strategy for the Wildlife Program was initiated. This will give overall direction to the Program and facilitate improved resource allocation.

Habitat Conservation Fund

Over 80 projects to enhance fish and wildlife habitat were completed at a cost of $1.46 million. Revenue from licence surcharges and other sources totalled $1.5 million. This allocation was the largest since inception of the fund, and the greatest number of projects were undertaken.

Public Conservation Assistance Fund

The Public Conservation Assistance Fund aided 32 projects in a variety of conservation, wildlife, and fisheries areas, providing a total of $78,680 to clubs and individuals throughout the province. An agreement was made with Wildlife Habitat Canada to supplement the fund by an additional $50,000.

Habitat Inventory

In 1985 the Habitat Inventory Section initiated a habitat mapping program to facilitate Regional Planning, and become more involved in correlating and standardizing mapping procedures.

Guidelines for monitoring habitat improvements were prepared in cooperation with the Range Branch of the Ministry of Forests, and a project to utilize Landsat in habitat mapping was conducted cooperatively with the Surveys and Resource Mapping Branch.

The ongoing biophysical mapping program was maintained. One ungulate capability map was prepared at 1:250,000, two at 1:100,000 and four at 1:50,000 scale.

Limited Entry Hunting Demand 1985/86

Species	Authorizations Available	Applications Received
Caribou	158	738
Elk	8,228	23,423
Grizzly Bear	68	598
Moose	6,253	23,029
Mountain Goat	1,972	6,217
Mountain Sheep	284	3,280
Mule Deer	1,605	7,712
Whitetailed Deer	995	5,780
Total	19,563	70,777

RESIDENT HUNTING LICENCE SALES 1983-1986

	1983/84		1984/85		1985/86	
	Number	$ Value	Number	$ Value	Number	$ Value
B.C. Resident	134,080	$1,877,120	126,233	$1,767,262	119,260	$1,669,640
Senior Citizen	10,589	10,589	10,697	10,697	10,976	10,976
Black Bear	17,537	140,296	17,362	138,896	15,238	121,904
Caribou	1,081	21,620	1,006	20,120	1,154	23,080
Cougar	415	8,300	501	10,020	461	9,220
Deer	117,757	942,056	113,717	909,736	111,897	895,176
Elk	15,985	319,160	17,305	346,100	17,502	350,040
Grizzly Bear	1,033	72,310	957	66,990	1,003	70,210
Moose	50,690	1,013,800	45,306	906,120	43,891	877,820
Mountain Goat	1,729	51,870	1,887	56,610	1,768	53,040
Mountain Sheep	1,509	75,450	1,514	75,700	1,491	74,550
LEH Hunting Apps.	50,307	150,921	72,320	216,960	76,418	229,254
TOTAL	402,712	$4,683,492	408,805	$4,525,211	401,059	4,384,910

NON-RESIDENT & NON-RESIDENT ALIEN LICENCE SALES 1983-1986

	1983/84		1984/85		1985/86	
	Number	$ Value	Number	$ Value	Number	$ Value
Non-resident alien	3,279	$295,110	3,619	$325,710	4,012	$361,080
Non-resident	678	9,492	660	9,240	592	8,288
Non-resident alien small game	341	13,640	325	13,000	288	11,520
Black bear	1,646	82,300	1,851	92,550	2,367	118,350
Caribou	373	44,760	404	48,480	455	54,600
Cougar	23	2,760	46	5,520	53	6,360
Deer	872	52,320	1,058	63,480	1,140	68,400
Elk	734	88,080	850	102,000	966	115,920
Grizzly bear	611	195,520	659	210,880	782	250,240
Moose	2,112	253,440	2,192	263,040	2,380	285,600
Mountain Goat	590	76,700	741	96,330	790	102,700
Mountain Sheep	336	100,800	412	123,600	414	124,200
Wolf	375	37,500	340	34,000	748	18,700
TOTAL	11,970	$1,252,422	13,157	$1,387,830	14,987	$1,525,958

Table 6.5 SUMMARY OF GUIDED HUNTER ACTIVITY IN THE 1985/86 HUNTING SEASON

Region	Number of Active Guide Outfitters	Number of Active Assistant Guides	Number of Guided Resident Hunters	Number of Guided Non-resident Canadian Hunters	Number of Guided Non-resident Alien Hunters	Moose	Mountain Goat	Caribou	Deer	Mountain Sheep	Grizzly Bear	Black Bear	Elk	Cougar	Wolf	Upland Birds	Waterfowl	Other
1	7	18	8	3	119	0	0	0	8	0	2	119	2	0	0	1	0	1
2	4	7	0	0	14	0	1	0	1	0	0	7	0	0	0	0	0	0
3	12	18	3	0	78	4	6	0	6	5	0	29	0	3	1	6	0	1
4	36	194	3	42	673	12	80	0	60	10	17	138	205	6	0	0	0	4
5	73	129	12	1	692	271	15	4	38	5	13	50	0	1	2	46	8	1
6	57	189	7	16	821	330	173	88	5	75	47	142	0	1	32	14	0	3
7	89	334	26	49	1276	698	149	116	10	149	87	199	129	1	12	52	5	5
8	12	38	7	7	159	1	2	0	40	2	0	89	0	25	0	0	0	2
*Prov. Totals	268	892	66	118	3,767	1,316	426	208	168	246	166	773	336	37	47	119	13	17

* Some guides and some hunters were active in more than one region, hence the sum of the regional figures in some guide and hunter categories exceeds the number given for the province.

BRITISH COLUMBIA WILD FUR HARVESTS 1978-1984

Number of Pelts by Fur Harvest Year

Species	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85
Beaver	20,413	24,309	18,166	14,895	11,815	12,666	13,297
Muskrat	40,426	35,540	30,798	27,606	21,580	25,328	14,841
Mink	5,266	7,686	5,961	4,086	4,110	4,165	3,183
Otter	834	939	747	702	429	543	673
Coyote	5,290	4,691	2,949	4,018	3,506	4,081	3,460
Fox	571	634	590	609	831	891	764
Wolf	406	268	228	194	184	186	232
Weasel	5,723	9,139	6,171	2,827	3,840	8,159	8,058
Wolverine	275	283	225	214	265	265	260
Skunk	24	38	23	34	22	60	23
Fisher	472	570	551	635	941	754	630
Marten	21,312	32,732	30,163	23,656	23,434	28,350	45,130
Lynx	1,577	2,848	3,693	5,463	6,264	2,760	1,668
Bobcat	240	140	130	231	184	215	271
Squirrel	73,830	183,110	76,209	33,949	79,348	87,375	31,663
Raccoon	1,486	1,179	615	1,473	667	791	978
Black Bear	566	480	358	295	382	368	364
TOTAL VALUE in $(Millions)	3.6	4.1	3.6	3.4	3.8	3.8	4.9

Estimates of Resident Hunter Harvest 1979 - 1984

YEAR	HUNTING	HARVEST										
	Licence Sales	Deer	Moose	Elk	Goat	Sheep	Caribou	Grizzly Bear	Black Bear	Grouse	Ducks	Cougar
1979	163088	29965	13045	1471	360	216	147	177	2731	478579	160307	150
1980	167879	36079	12486	1996	421	198	138	180	5670	306057	145549	117
1981	174088	35190	10752	1811	396	263	127	225	3247	214656	145713	106
1982	154143	34774	10906	2532	408	183	150	185	3180	258461	117564	130
1983	144669	29804	9613	3321	581	218	145	201	3557	179078	86007	120
1984	136930	32673	9196	4183	576	192	150	195	3531	133683	112150	160

Water Management Program

Objectives

The goal of the Water Management Program is to manage provincial water resources to maximize their contribution to the social and economic development and well-being of all British Columbians.

Objectives include:

1. A high level of water resource quality for groundwater, fresh surface water and estuarine and coastal marine waters achieved through the establishment of resource quality objectives, water quality monitoring, watershed planning, the referral and consultative processes, and assistance in the control of nuisance aquatic vegetation.
2. Assured protection of licensed private rights and instream uses through allocation and regulation of the supply and use of surface water under the Water Act.
3. Reduced potential for property damage and loss of life due to flooding and erosion through runoff forecasting, snow surveys, emergency action, regulation of floodplain development, investigations for and implementation of flood and erosion protection projects, and inspection and maintenance enforcement for dykes and dams.
4. An assured adequate level of water service to those supplied by privately owned utilities; regulation of water utilities, and provision of technical support including project management to funding ministries.
5. An adequate information base on the supply capability of surface water and groundwater resources through the collection, storage and analysis of data.
6. A high level of public health engineering support for the Ministry of Health through approvals and inspection of water supply sources, supply and treatment works, swimming pools and waste disposal systems.
7. A water management program which is managed cost effectively through planning, budgeting, fiscal control, program evaluation, asset control, effective communication systems, personnel system administration, administrative support services, a technical support system, and staff safety and training.

Legislation Administered

Water Act and Regulations
Drainage Ditch and Dyke Act
Dyke Maintenance Act
Libby Dam Reservoir Act
Water Utility Act
Utilities Commission Act
Land Title Act

Water Allocation and Regulation

Water Licensing

During this fiscal year, 1,001 applications for new water licences were received and 1,527 conditional and final water licences were granted under the Water Act, along with 480 associated permits to occupy Crown Land. This is the second year that water licences were issued by regional water managers, and 1,098 of the licences granted were issued in the regions. At the end of the fiscal year, 2,217 applications were awaiting decision, 92 in Victoria and 2,125 in the regions.

As of March 31, 1986, there were 37,487 active water licences on record, up 729 from a year previous. Of these, 1,490 licences are under review for consideration of amendments to the rights granted. Victoria administrative staff processed 3,366 licensee name or address changes. In the fiscal year, Victoria staff removed from active status 666 licences, either due to abandonment by the licensee, cancellation by the comptroller, or replacement by another licence.

The issue of approvals under Section 7 of the Water Act is largely the responsibility of the regions. A total of 1,146 such approvals were issued during the period under review.

During the fiscal year, nine appeals from orders of an engineer and twenty appeals from licensing decisions of a regional water manager were heard by the comptroller. Nine appeals from decisions of the comptroller were heard by the Environmental Appeal Board.

A total of 85 new water licensing maps affecting 1,121 water licences were produced and installed in the regional offices.

Power and Special Projects

The monitoring of the operations of public utilities, including the entities under the Columbia River Treaty, and of private companies engaged in the generation of electricity, was continued under the Power and Special Projects Program.

The monitoring of reservoir slopes where potential slides have been identified continues to be an important function of the Power and Special Projects Program. Specialist consultants are retained when necessary to advise on unusual problems. A remedial drainage works similar to that in operation at the Revelstoke Reservoir Downie Slide is now being proposed for a possible slide area in the Mica Reservoir.

Special projects undertaken in the year under review included reservoir clearing and debris clean-up, ice problems on the Peace River, and the seismic stability of a proposed ammonia storage tank at Kitimat.

Skagit Valley Flooding Agreement

The agreement between the Province of British Columbia and the City of Seattle, signed in 1984 to prevent the flooding of the Skagit Valley by Seattle's proposed High Ross Dam, was partially transferred from the Province to the British Columbia Hydro and Power Authority in December 1985.

B.C. Hydro began power deliveries to Seattle in January 1986 and is currently reviewing its right under the agreement to increase power generation at Seven Mile Dam, by raising this dam to flood a short distance upstream into Washington State.

Flood Damage Prevention

Runoff Forecasting

Forecasts of the total volume of runoff for the spring and summer snowmelt period were made for all major river basins in the Province. Weather and streamflow data were collected from many sources including the Ministry's four automatic high level snow course and meteorological stations. These data were used in computer models to make short-term predictions of water levels and flow rates at various locations as required during the freshet. A cool, unsettled spring delayed the melt such that the peak flows recorded on the Fraser River were above average, but no damaging flooding occurred.

The flood warning system for the Squamish River was activated in the fall with weather, snow conditions and streamflow data being collected and evaluated. Although there were some heavy rains during October, conditions were such that no damaging floods were predicted or occurred.

Snow Surveys

During and prior to the snowmelt period, 1331 snow surveys were carried out at the province's 261 permanent snow survey stations. The measurements were published in six issues of the Snow Survey Bulletin. The 1981 to 1985 snow survey data were prepared for publication in the Snow Surveys Measurements Summary, 1935-1985.

Following the successful operation of four new automatic snow stations during 1984/85, two manual stations became redundant and were dismantled. The Water Management Branch now operates ten automatic and five manual snow sensor stations, some in cooperation with other agencies.

Floodplain Planning

A total of 373 zoning bylaws, rural land use bylaws, bylaw appeals and official community and settlement plans, 864 proposed subdivisions and 984 Crown land lease and fee simple applications were reviewed for flood control requirements. This represented a significant increase over the previous year.

Floodplain Mapping

Floodplain mapping was completed for the following areas: Alouette and North Alouette Rivers, Bulkley River at Houston, Cheakamus River, Coquihalla River at Hope, Englishman River, Salmon River near Prince George, Vedder River and Zymoetz (Copper) River. A total of 770 map sheets were distributed during the year in response to requests from government agencies and the private sector.

Dyke Maintenance

The purpose of the Dyke Maintenance Program, under the Inspector of Dykes, is to ensure the safety, proper maintenance and operation of all dykes in the province except private dykes as defined in the Dyke Maintenance Act.

During 1985/86, inspections of dykes in the Lower Mainland, Fernie, Hope, Duncan, and Whistler were done. Approximately 65 approvals for changes to dykes were made. Administration and operation of the Coquitlam Dyking District by the Inspector of Dykes' office continued during 1985-86. Technical advice and information on dyking was provided to various dyking districts and the public.

Drainage

Applications for 17 new drainage projects, having a total value of $11,000,000, were received during the first year of the new five-year Agri-Food Regional Development Subsidiary Agreement (ARDSA). Preliminary engineering assessments were completed for three projects. Studies also continued on proposed drainage projects at Erickson Ditch in Surrey, and at East Delta.

No construction projects were initiated during the year.

Dam Safety

The Provincial Dam Safety Program covers more than 2,000 storage and diversion works, of which 146 are classified as major dams. These major structures are the responsibility of the Victoria office which carried out 103 regular and follow-up inspections during the 1985/86 fiscal year. During the same period, regional staff inspected 421 minor dams.

Using special instrumentation, the performance of 24 high hazard dams continued to be monitored and one new dam had instrumentation installed. Underwater inspections were carried out at 27 major dams by head office staff divers.

With the current lull in construction of major hydroelectric projects, attention was concentrated on the review of older, smaller power projects, which may not meet current design standards, particularly with respect to spillway capacity and resistance to earthquakes. Extensive rehabilitation works were undertaken at Alouette, Coquitlam, Stave Falls, Sugar Lake and Cheakamus Dams. Comprehensive reviews of other dams, including John Hart, Strathcona and Ladore Falls have indicated that remedial measures are required to meet modern seismic design requirements.

All major dam owners have now been advised to prepare operating and maintenance manuals along the lines of a guide issued by the ministry. The manuals are designed to provide reliable operating instructions and technical data on specific structures, particularly at times of staff turnover, or when operating staff are not available during an emergency.

Channel Clearing and River Protection Assistance

During the year, many requests for assistance with river protection works were received while some 31 projects costing a total of $520,000 were completed. Local landowners and municipalities contributed 25 per cent of this cost. One stream clearing project was undertaken at a cost of $2,200.

The Accelerated Dyking Program, started in 1983/84 was completed. During the year seven projects were completed at a cost of $1.9 million.

A new program, the Dyking Program was initiated to assist municipalities with the construction of major dyking projects and twelve projects costing $4.0 million were completed.

Design was completed for the replacement of the Nicola Lake dam and construction was commenced. Total expenditures for the year was $1.2 million with completion scheduled for June, 1986.

The Province has entered into an agreement with the State of Washington to replace the Zosel Dam in Oroville, Washington. This dam controls lake levels on Osoyoos Lake and provides water for irrigation and domestic and recreational use. The total estimated cost of the project is $9.0 million to be shared equally between the Province and Washington State. The design has been completed and two contracts have been awarded amounting to some $3.5 million. The project is scheduled for completion in December 1986.

Fraser River Flood Control

This program, carried out under a federal-provincial agreement signed in 1968, as amended now allows for an expenditure of $161 million, shared equally by the two governments.

Expenditures to March 31, 1985, totalled $120 million while the expenditures for the fiscal year 1985/86 amounted to $4.6 million.

Special Studies

Investigations were carried out and reports prepared regarding a number of landslide and natural hazard areas throughout the Province. There was also a continuation of monitoring of bedload movements on several debris torrent prone creeks on Howe Sound.

Resource Quality

Water Quality

Major activity was concentrated on the preparation of water quality criteria and objectives. Water quality criteria are safe levels of contaminants for various classes of water use. Water quality objectives are the criteria adapted to protect the most sensitive water uses in a specific waterbody. The objectives guide waste and water management, and establish a reference against which the state of water quality at a particular site can be checked.

During 1985/86 criteria were established for cyanide and for nutrients and algae. Work is in progress on criteria for 12 other characteristics of water quality. Provisional objectives were completed for seven bodies of water, including objectives for phosphorus in the Okanagan Valley lakes and for a variety of characteristics in the lower Fraser River. Work is in progress for 15 other bodies of water.

A water quality monitoring agreement between Canada and British Columbia was entered into. It provides for long-term monitoring of trends in water quality at stations throughout the province. At 23 key stations the operating costs will be shared equally by the two governments.

Trends continue to be monitored at six lakes in the Lower Mainland and southern Vancouver Island regions to determine the future effects of acid precipitation. More than 700 lakes have been tested for acid sensitivity to date, including 85 in 1985.

The Groundwater Program provided technical input to the Eastern Municipalities Solid Waste Study and undertook investigations and otherwise contributed to 12 environmental impact assessment studies for major developments, 5 groundwater protection studies related to natural phenomena, waste disposal and accidental spills. Under the Groundwater Monitoring and Assessment Program, 113 groundwater quality overlay maps were completed showing the locations of 500 wells with water quality information and 3 reports were prepared on quality concerns.

Littoral Resources

About $315,000 was allocated to provide 75 per cent of the operational costs of Eurasian water milfoil control projects in high-use public recreation areas of six mainstem Okanagan Valley lakes and in Shuswap, Cultus, and Long lakes. In addition to the major increases in funding for cost-shared control programs, about $120,000 was provided for new equipment.

In 1985, surveillance was performed on about 40 lakes on Vancouver Island. New populations of Eurasian water milfoil were found in Long Lake, in the backwaters of the Cowichan River and a number of private ponds.

The area affected by this plant doubled from 1984 to 1985 in the Salmon Arm of Shuswap Lake, where the expanded control program contained the problem.

In the Kootenays, small colonies of Eurasian water milfoil in Champion Lakes were hand-pulled by divers with apparent success.

Water Quantity

Groundwater

During the fiscal year 1,863 water well records were collected from drilling contractors, a total of 5,094 water well records were completely processed and an additional 2,384 were partly processed.

A total of 1,325 general enquiries for groundwater information were answered and water level fluctuations were monitored in 141 observation wells located in various parts of the province. Two new observation wells were added to the network.

Under the Groundwater Program, 10 assessments were completed involving groundwater supply potential and groundwater use conflicts together with 11 well capacity reviews for community water supplies. Over 450 copies of two publications on ground water development and well construction guidelines were distributed on request.

Surface Water

The federal-provincial ccoperative network of hydrometric stations declined to a total of 592 during 1985, due to funding limitations. During the year there were twelve stations added, while 38 were discontinued.

Water Supply Projects

Supply Project Feasibility Studies

The new Canada-British Columbia Agri-Food Regional Development Subsidiary Agreement (ARDSA) was signed in July 1985 which provides $40,000,000 to the development of the agricultural industry in B.C. over a five-year period. $17,500,000 is available under Program 2 of the agreement to assist irrigation, drainage, soil conservation, and water conservation projects.

Feasibility studies for water supply and irrigation projects are normally initiated through requests to the Ministry of Agriculture and Food for assistance under the ARDSA Program. By the end of the 1985/86 fiscal year, applications had been received for 23 water supply and irrigation projects, with a total construction value of over $18,000,000, and preliminary engineering assessments were completed for eleven potential projects. Detailed feas bility studies were undertaken for two projects.

Water Supply Project Implementation

Final design and construction supervision of ARDSA projects is normally carried out or monitored under the Water Supply and Drainage Program.

Engineering services were also provided to the Fisheries Branch for the construction of new groundwater supplies to the Hill-Mackenzie Hatchery, near Revelstoke.

Community Water Supplies

Authority to construct and operate a privately-owned water system for the supply of water to the public for compensation is provided through a certificate of public convenience and necessity issued by the Comptroller of Water Rights under the Water Utility Act and the Utilities Commission Act. In the 12-month period ending March 31, 1986, 21 applications for certificates were received. A total of 18 certificates were issued during the year.

Eighty orders of various kinds were made by the comptroller and 35 new or amended tariffs were examined and accepted for filing.

Public Health Engineering

A total of 401 Final Certificates were issued for authorization of waterworks construction by Public Health Engineers. This is a delegated responsibilty from the Minister of Health. There were also 99 Certificates of Authorization issued during the reporting period for swimming pool construction in accordance with an administrative agreement with the Ministry of Health.

Resource Management Projects

Regulation of Okanagan Main-Stem System

For the first time in five years, inflow to Okanagan Lake was below normal with only about 60 per cent of its annual average inflow occurring. Despite this, Okanagan Lake was regulated such that it peaked within 10 cm of its normal upper limit and there was sufficient water for all users around Okanagan Lake and downstream along Okanagan River. The normal amount of storage was carried over the winter so that Okanagan Lake was at its target level on February 1, 1986.

Vedder River Floodway

The dykes and floodboxes constructed under the Fraser River Flood Control Program were handed over to the Municipality of Chilliwack for operation and maintenance.

The area between the setback dykes is administered by the Vedder River Management Committee and a number of lease agreements were concluded for agricultural purposes. Monitoring of river sedimentation continued.

REVENUE

Water Licensing Rentals and Fees

	Year Ending Mar. 31, 1982	Year Ending Mar. 31, 1983	Year Ending Mar. 31, 1984	Year Ending Mar. 31, 1985	Year Ending Mar. 31, 1986
POWER	$ 94,900,216	$ 189,808,981	$ 172,739,369	$ 193,623,612	$ 220,183,055
WATERWORKS	337,579	274,896	495,247	486,976	524,635
IRRIGATION	24,298	32,314	48,652	52,063	45,482
OTHER RENTALS	1,134,053	1,110,872	1,116,420	1,144,313	1,269,289
APPLICATION FEES	202,616	314,499	167,680	127,090	138,320
INTEREST	-	-	1,241	143	-
TOTAL REVENUE	$ 96,598,762	$ 191,541,562	$ 174,568,609	$195,434,197	$ 222,160,781

Note: - Power revenue is that received from public utilities and other major operators. Small private developments are included under other rentals.
- Waterworks and Irrigation revenue is that received from local authorities responsible for distributing water to their residents. Revenue from water utilities, individual irrigation users is included under other rentals.
- Other rentals includes charges noted above plus rentals assessed for Industrial, Mining, Domestic, Storage and other purposes and for Permits to Occupy Crown Land.

- Reporting period changed from calendar year to fiscal year as of March 31, 1981
- Power rentals subject to annual indexing (1982 - 1985)
- All Water Licence rentals and fees increased as of January 1, 1982.
- Interest charged on overdue accounts on January 1, 1984.

Number of Active Water Licences:

As of March 31, 1982	34,295
As of March 31, 1983	34,520
AS of March 31, 1984	35,960
As of March 31, 1985	36,758
As of March 31, 1986	37,487

Air Management Program

The goal of the Air Management Program is to maintain atmospheric quality in British Columbia at a level conducive to good health and a quality environment, and to provide atmospheric information necessary for the management of British Columbia's resources.

The objectives of the Air Management Program are:

1. To establish air quality standards and to monitor major airsheds in the province to ensure the standards are maintained.
2. To develop and implement airshed management systems to ensure air quality which is conducive to good health and to maintenance of the province's natural resources.
3. To provide atmospheric data and expert services to ministry programs and other agencies.
4. To regulate weather modification.

Legislation Administered

Environment Management Act
Weather Modification Act

Air Quality Standards and Monitoring

The development of ambient air quality criteria continues with documents for particulates and dustfall, sulphur dioxide, carbon monoxide, nitrogen dioxide, ozone and fluorides completed and waiting release. Criteria in preparation include hydrogen sulphide, chlorine and acid rain. A summary report, "Air Quality Standards for British Columbia" has been prepared and is also waiting release.

Preliminary air quality objectives have been drafted for Prince George and the maps drawn. Discussions on the setting of objectives in Kitimat and the Howe Sound area continue.

Air quality monitoring was conducted at about 502 locations in the province. This included the operation of 39 continuous air monitors and approximately 18,000 laboratory analyses of airborne pollutants. Ministry and industry continuous air quality monitors were routinely audited for quality control. The special joint government/industry monitoring project in Prince George continues to address the high level of pollutants in the area. Installation of six meteorological stations and a number of air quality stations was completed on the Lower Mainland as part of the ongoing ozone study. As well, meteorological stations were installed at Saturna Island, Trail, Castlegar and Nelson.

Acid rain monitoring continued throughout the province, with a focus on the Georgia Strait area, with data being collected from eight federal and twelve provincial stations. In addition, lake acidity sampling continued at eight lakes in southwestern B.C. Data are also monitored for the water supply areas of the Capital Regional District and the Greater Vancouver Regional District.

As part of the Western Canada acid rain program, the National Research Council has been contracted to develop a criteria document for western Canada.

Development of new environmental data management systems continue. The Continuous Air Monitoring Information System (CAMIS) provides air quality reports of the various monitored air pollutants. The Meteorological Information System (MIS), providing meteorological data storage and reports, has now been implemented.

The contract to identify injuries to sensitive tree species exposed to sulphur dioxide continues and the monitoring of air quality using vegetative indicators was explored.

Program staff continued to participate in joint industry/government committees monitoring coal dust levels in the province. A resulting report "Recommended Practices for Loading, Unloading and Transportation of Coal by Trains" will shortly be available.

An assessment of air quality trends in the province from 1976 to 1982 was completed and waits publication.

Air Management

Management systems continue to be identified in order to regulate critical pollutants in priority airsheds. Air management control plans have been prepared or are in preparation for Port Alice

and Trail for sulphur dioxide, the Howe Sound area, Prince George and Kitimat for total reduced sulphur, the Lower Mainland for ozone and Williams Lake for particulates.

In Prince George, an inventory of low level sources of total reduced sulphur has been completed and discussions of control options with industry continue.

Acid rain control strategies continue to be pursued via agreements with the other western provinces and Washington State. Studies to identify some of the sources contributing to the chemical loading of precipitation, particularly in the Georgia Strait, are ongoing.

As part of the control strategy for ozone in the Lower Mainland, the Greater Vancouver Regional District with assistance from the ministry has developed and put into place, an air quality index. As well, the ministry initiated a task force to review and recommend options for vehicle inspection and maintenance programs as a method of reducing ozone precursor pollutants. Staff have also developed the capability to model photochemical dispersion. A preliminary report of the economic impact of photochemical oxidants on agriculture and forestry has been completed.

Real-time air quality data access is now available in Victoria, Trail and Prince George and will shortly be available in some other areas of the province. This will assist Regional Waste Managers in providing a quicker response to air quality problems.

As a first step in addressing the problem of woodsmoke, a report "An Investigation of Residential Wood Combustion Emissions and Control Programs in Canada and the U.S.A." was initiated.

Courses were held throughout the province to instruct staff on the use of dispersion models that were recently delivered to the regions. Detailed evaluations using complex dispersion modelling were performed for the proposed aluminum smelter near Vanderhoof, the ammonia plant at Kitimat, the Endako mine, the Meadow Creek dioxins inquiry and the Greater Vancouver Regional District incineration proposal.

The contract work on the comprehensive emission inventory for the entire province, excluding the GVRD area, was completed. Staff are also involved in the studies for a comprehensive inventory of emissions in the GVRD, including a proposed study on hydrocarbon emissions from gasoline and other fuels.

Atmospheric Data and Expert Services

The Environmental Laboratory continues to supply training for stack sampling and smoke opacity monitoring, enhancing the ministry's enforcement capabilities for air emissions. In addition, a program of emissions measurement of various industrial sources continues, as well as the routine performance auditing of industrial emission samplers.

The development of emission guidelines for municipal incinerators in the Lower Mainland was completed. Detailed planning of emission criteria in Waste Management Plans is ongoing.

Program staff investigated the existing objectives, regulations and standards for emissions from ammonia-urea manufacturing plants as well as the air quality criteria for ammonia.

Staff were involved in a joint project with the Waste Management Program in the development of guidelines for special waste destruction facilities and in the research and evaluation of such projects.

Computerized data files containing all air quality and climatological data for the province were maintained.

The operations of 92 meteorological stations were coordinated by the program, collecting data on temperature, precipitation, wind and solar radiation.

Staff responded to 286 requests for climatological data or services from government and the public. A survey was completed assessing the suitability and effectiveness of supplying these data and services. Staff assessed 16 major industrial permits and reviewed 60 air emission permit application/amendments.

The Okanagan climate capability for agriculture maps have been completed and published. Data analysis for the West Chilcotin project is on hold. The Creston valley frost risk mapping and farm weather service project was initiated as a joint federal/provincial undertaking.

A dryness index was prepared for the Ministry of Forests as an aid in predicting potentially bad forest fire seasons.

The climate/pest management models continue to be developed as an aid to fruit growers in the Okanagan.

Weather Modification

One proposal under the Weather Modification Act was received and is being evaluated.

Waste Management Program

The goal of the Waste Management Program is to protect the environment of British Columbia by controlling the impact of polluting substances.

The objectives are:

1. to preserve the quality of the air in the province at or above acceptable levels by managing the discharges of pollutants to the atmosphere.
2. to preserve the quality of the water environment of the province at or above acceptable levels by managing the discharge of pollutants.
3. to preserve the quality of the land environment of the province at or above acceptable levels by managing the discharge of pollutants.

Legislation Administered

Waste Management Act
Environment Management Act
Litter Act

General

Since 1982 the emphasis on collective solutions to municipal solid and liquid waste disposal problems has continued through the development of Waste Management Plans. The Minister has approved a solid waste management plan for metropolitan Vancouver in which landfilling will continue but volume reduction will be achieved through more active recycling and construction of a new state-of-the-art incinerator. Several other Waste Management Plans are in preparation throughout the province. The Okanagan Basin has been declared an environmentally sensitive area owing principally to over-nourishment of the lake system. Some $20 million has been allocated to support development and implementation of nine management plans to cover the major population centers in this area.

Emphasis has also continued on achievement of permit compliance. Over three thousand existing discharge permits have been evaluated for environmental impact. This will allow more effective deployment of manpower for surveillance and enforcement activities.

Environmental Safety

The last of eight regional special waste storage facilities across the province was completed and became operational this year. These facilities accept small quantities of special wastes from households, public institutions, and other small operations. Two shipments with a total of 123 drums of special wastes, were sent for treatment and/or disposal to Syntath Ltd. in Ontario. Another 10 drums of solvents were sent to the incineration facility at the University of British Columbia.

The Environmental Safety Program received 667 spill reports with 240 requiring on-site response by Regional staff. The total number of spill reports increased 27 per cent over those in the previous fiscal year. Considerable staff time was also devoted to the management of waste fluorescent light ballasts containing PCBs and the disposal of woodwaste contaminated by chlorophenates at Meadow Creek.

During the year, 69 industrial operations were requested to prepare spill contingency plans and one new plan was completed. A total of 128 contingency plans have now been requested, and 13 completed. Ocelot Industries' proposed ammonia plant at Kitimat received considerable attention.

Six Regional Environmental Safety Program Officers received intensive hands-on spill response training at Texas A & M University. All Regional Environmental Safety Program staff members are now trained to the prescribed Personal Protection Level A standards in accordance with ministry procedures.

An audit of the Environmental Safety Program was completed in two ministry regions to assess compliance with policies and procedures, to examine allocation of manpower, and to identify the need for changes. This audit has now been conducted in four out of the five regions.

Technical Services Section

The ministry sponsored a three-day seminar in Vancouver to acquaint elected officials and their staff with the latest thermal techniques to achieve volume reduction and recover heat energy. Approximately 120 people attended this seminar.

Committee work continues in conjunction with the Council of Forest Industries to find an economic alternative to the use of pentachlorophenol as a sap-stain retardant in the treatment of lumber. This compound contains traces of dioxins and furans which are not destroyed by low tem-

perature combustion or other ordinary waste disposal techniques.

Joint studies are also underway with the federal government to evaluate the significance of emissions when treated scrap lumber is burned.
An educational package dealing with waste management was prepared for use in the public school system. This publication will assist teachers in educating students as to where and how waste is created, the consequences of disposal on the environment and how volumes can be reduced by better resource management and recycling.

Policy Evaluation and Data Management

Internal program evaluation is continuing to ensure that a consistent approach is taken in the administration and delivery of the Waste Management Program.

In keeping with modern business methods the ministry is developing computer software packages to assist in program administration, called Permit Administration Scheduling System (PASS), and also a data storage and retrieval package called System for Environmental Assessment and Management (SEAM). These two systems provide for a rapid review of permit status in the former case and monitoring data in the latter. PASS is now fully operational although work is continuing on improvements to the system. SEAM is in limited operation and software development is continuing.

Vancouver Island Region

The Regional District of Nanaimo selected a consultant to proceed with the technical aspects of Stage Two of their Solid Waste Management Plan.
Buttle lake quality continues to show improvement and the monitoring program is to be reduced. Some operational problems at the mine site have resulted in abnormal discharges to Myra Creek.

Safety Program staff conducted extensive sampling and directed clean-up of ash and debris from a sawmill fire near Ladysmith which involved a large number of PCB capacitors. Staff also inspected James Island near Sidney, the site of a former explosives plant, in conjunction with a site decommissioning program being undertaken by CIL.

Receiving-water monitoring in Neroutsos Inlet indicated an extremely low dissolved oxygen content. Although several factors may be responsible for this condition (including the Port Alice sulfite mill effluent), it was decided to approach the mill with regard to reducing the BOD levels in the effluent.

Meetings were held with the Ministry of Energy, Mines and Petroleum Resources, and the Environmental Protection Service, to discuss treatment and reclamation options at Mt. Washington/Pyrrhotite Creek. Agreement was obtained with regard to proposed monitoring.

An increase has been seen in the number of applications for waste discharges from aquaculture operations proposed or already operating within the region. The development of the aquaculture industry in the province has been encouraged by the ministry, but problems are being encountered with associated legal permit requirements.

Staff attended a North Saanich Sewage Committee meeting to discuss the possible expansion of the Bazan Bay sewage treatment plant and the concept of waste management planning in the North Saanich municipality.

Discussions were held with Ladysmith about terminating the practice of discharging sludge from the Ladysmith sewage treatment plant to Ladysmith Harbour. A potential sludge composting site near Crofton was investigated.

Lower Mainland Region

The "Greater Vancouver Sewerage and Drainage District, Waste Management Plan for Refuse" was approved in accordance with section 16 of the Waste Management Act. The District is now working on a Waste Management Plan for effluent, as is the Sunshine Coast Regional District. The Central Fraser Valley and Dewdney Alouette Regional Districts are cooperating in the development of a Waste Management Plan for refuse.

Increased surveillance and enforcement activities have helped improve emissions from problem wood waste burners in the Fraser Valley.

Regional staff served on the Bowen Island Sewage Disposal Interministerial Technical Committee. A final report was completed.

A major $50,000,000 upgrading program for the Iona Island sewage treatment plant was negotiated with the G.V.S. & D.D.

Preparations for Expo 86 resulted in additional workload for regional staff due to expansions and additions to recreation vehicle parks, floating hotels and temporary marinas.

Pacific Coast Terminals completed major improvements to their stormwater collection and effluent treatment system.

A CNR train derailment near Fort Langley resulted in a major spill (250,000 litres of ethylene dichloride, 70,000 litres of caustic soda), causing groundwater contamination. Clean-up activities are continuing.

Southern Interior Region

The Columbia Shuswap Regional District applied for and was granted an approval to establish disposal facilities for septic tank sludge and holding tank wastes generated in the Sicamous area.

Following severe public complaints regarding houseboat activities on Shuswap Lake, the Columbia Shuswap Regional District undertook a Shuswap Lake Managment Plan. The ministry is participating in this process.

Agricultural waste management has been improved in most areas of the Thompson Nicola Sub-region. The cooperation of the ranching and farming communities has been the most important factor.

Contingency planning with Thompson-Nicola Sub-region industries continued with implementation of quarterly reporting to headquarters of plan changes. In accord with BCPA/MOE agreements environmental inspections were completed on all Thompson-Nicola bulk oil plants.

Blackdome exploration began construction of a gold/silver mine and mill complex located approximately 68 km NNW of Clinton. Cyanide will not be used at this mine-mill.

Particulate emissions from woodwaste burners in Williams Lake continue to be a problem and are a focus of Waste Management efforts in this area.

A report on airborne copper contamination in the vicinity of the Gibraltar mine loadout facility near Macalister was completed.

Sampling of Dragon Lake near Quesnel showed that it is not on an irreversible trend towards eutrophication. Connection of many lakeside homes to a sewerage system discharging into the Cariboo Pulp treatment lagoons should reduce the rate of nutrient addition to the lake.

Mascot Gold Mines has submitted a Stage One Environmental Impact Report for a proposed mine near Hedley. Waste Management has completed a technical review of this report and initiated chemical and biological sampling programs.

An Okanagan Water Quality Group was set up in the Penticton Sub-regional office to correlate Waste Management Planning in the area and to administer funding of implementation of Waste Management Plans.

Kootenay Region

The installation of pollution abatement works continued during the year with the installation of a silo woodwaste burner at Slocan and a new woodwaste burner at Canal Flats. A special waste storage facility was constructed in Nelson to meet the demand for disposal of special wastes from the public and institutions.

The St. Mary River, which once received large volumes of untreated effluent from various Cominco operations in Kimberley, has been rehabilitated to a point where a major sport fishery has developed in the stream. A significant Kokanee spawning run has been observed in the river at the present Cominco waste water treatment plant outfall.

The Regional District of East Kootenay received funding approval from the Ministry of Municipal Affairs to undertake studies to service the northeast shore of Lake Windermere. The studies will address the layout of sewer service for the central area and the alignment of a trunk sewer to the Invermere STP.

CPR Revelstoke have begun to address the long-standing problem of oil-contaminated runoff from their rail yards. They have retained a consultant to quantify the problem and make recommendations for pollution control works.

The City of Trail and the Regional District of Kootenay Boundary received Stage One approval for their Waste Management Plan for refuse disposal in the Trail-Rossland- Fruitvale area. Their technical committee is about to finalize their evaluation of the options for refuse disposal. The draft Stage Two report will then be submitted to the steering committee for approval to proceed to a public information open house.

The region implemented a monitoring program for dioxins and furans to document the impact of open burning woodwaste contaminated with small amounts of chlorophenates. No dioxins or furans were detected in ambient air samples.

A report titled "Kootenay Lake: 1984, a compilation and synopsis of physical, chemical and biological data from 1968 to 1984" was completed by regional staff.

Northern Region

The Omineca-Peace and Skeena regions were combined to form the Northern Region with the headquarters in Prince George, a zone office in Smithers and a field office in Fort St. John.

Total reduced sulphur ambient air levels in Prince George continued to exceed the ministry objective by a significant margin. Negotiations

are continuing with the three pulp mills in the area to develop an upgrading program.

A joint government/industry study of the Kitimat air and watersheds has commenced to determine the environmental impact of the aluminum smelter, pulp mill and methanol/ammonia plant.

B.C. Hydro constructed two large steel buildings to safely store the thousands of PCB capacitors at the Kennedy substation located near Mackenzie.

Acid mine drainage at the Equity Silver mine continues to be a problem. Waste Management hired a specialist consultant to review the material handling and reclamation procedures and determine ways of reducing the generation of acid drainage.

The use of auxiliary-fired, brick-lined incinerators for burning garbage generated from logging, mining, construction and oil drilling camps throughout the northern region has significantly reduced the bear/human conflict.

In response to an effluent problem from their pulp mill in Mackenzie, B.C. Forest Products hired a consultant to review the problem. The company is presently in the process of implementing the recommendations of the consultant.

The City of Prince Rupert is presently working on a receiving environment monitoring program in the harbour to determine the effect of their untreated sewage discharge. Following the conclusion of this study, a decision will be made on the requirement for additional long outfalls.

Ocelot Industries is presently constructing an ammonia plant at their existing complex in Kitimat. The ministry is working with the company to ensure that all the necessary safety measures are adopted to minimize the environmental risk of ammonia releases to the atmosphere.

Conservation Officer Service

The following acts are enforced:
Waste Management Act
Environment Management Act
Litter Act
Statistics January 1, 1985 to December 31, 1985

Waste Management Act and Regulations

Number of Charges	105
Number of Warnings	5
Number found Guilty	7
Number found not Guilty	2
Number charges Stayed	10
Number charges Withdrawn	4
Total fines	$13,200

Litter Act

Number of Charges	33
Number of Warnings	4
Number found Guilty	30
Number found not Guilty	0
Number charges Stayed	2
Number charges Withdrawn	0
Total fines	$1,825

Pesticide Control Program

The Pesticide Control Program is responsible for ensuring that useful, federally-approved pesticides are used safely in the province in a manner that will not produce an unreasonable adverse effect on people or the environment.

The Program includes eight major activities:

1. administering the Pesticide Control Act,
2. establishing conditions for and issuing permits for various types of pesticide uses,
3. providing study kits and offering adult extension courses on the safe use of pesticides,
4. setting exams for and issuing cerificates to individual pesticide applicators and dispensers who have a basic knowledge about pesticides,
5. establishing standards for and issuing licences to pesticide vendors and pest control service agencies,
6. conducting inspections and investigations of pesticide accidents and misuse,
7. supplying the public with technical information on pesticides, and
8. conducting monitoring surveys into pesticide sale and use and into environmental contamination.

Statistics on these activities are summarized in the table following this section.

Permits

Pesticide use is regulated partly through the permit system. Use permits are required for pesticides applied to publicly-owned land, water bodies, or land that is used for forestry, transportation or public utility purposes. Special Use permits are granted for research trials involving unregistered pesticides. Restricted Use permits are granted for highly toxic or highly persistent compounds listed in Schedule I of the Regulations.

There were 781 applications for Pesticide Use Permits in 1985, a 40 per cent increase over 1984. In addition, there were 41 applications for Special Use Permits and 41 applications for Restricted Use Permits in 1985.

Assistance in reviewing Pesticide Use Permits is obtained from regional program managers and members of the Pesticide Control Committee, which is represented by members from the ministries of Forests and Lands, Environment and Parks, Agriculture and Fisheries, Health, and Environment Canada. All permits are issued from headquarters through the Permits Coordinator.

Anyone who disputes the issuing of a Pesticide Use Permit can appeal to the Environmental Appeal Board. During the past year, there were appeal hearings on 39 permits. The Environmental Appeal Board added or amended conditions to 12 permits and denied appeals on 26 permits.

Training and Certification

Training, evaluation and certification of pesticide applicators and dispensers are a major focus of the program's activities, ensuring that those people who handle and sell pesticides acquire knowledge of pesticide technology. The training program is coordinated from headquarters. The courses are delivered, candidates examined, and certificates issued by regional staff.

In 1985/86, regional staff presented 101 adult pesticide training courses. Attendance at these courses increased significantly over previous years. A total of 3,712 certificates were issued during the past fiscal year (up 27 per cent over 1984). Of the certificates issued, 2,389 were issued to qualified applicators and 1,323 were issued to qualified dispensers.

Work continued on a major updating and revision of the Handbook for Pesticide Applicators and Pesticide Dispensers which is used as the pesticide training manual. Study kits incorporating the training manual and other publications are being updated. Extra courses were conducted to certify forest pesticide applicators because of the new provincial/federal agreement to encourage reforestation in British Columbia.

Licences

The four regional offices issued a total of 3,375 licences in 1985/86 (1,228 pesticide vendor licences and 1,147 pest control service licences).

Compliance

Regional staff are involved in enforcing all aspects of the Pesticide Control Act and Regulations. For example, an inspector may examine a vendor's storage facilities or ensure all permit conditions were observed during a pesticide application. In 1985/86, they inspected 2,231 pesticide service and vendor premises and 277 permit sites. As a result of these inspections, 22 licences were suspended, one permit was suspended and 23

charges were laid. Numerous warnings were issued for minor infractions. Increased efforts to inspect vendors in the Northern Region resulted in greater compliance with the Regulations covering pesticide sales and storage.

Investigations

Staff investigated 199 alleged poisonings of humans or domestic animals or spray drift damage to vegetation. The circumstances of several spills were examined.

A contamination of greenhouse cucumbers with the pesticide aldicarb resulted in 150 to 200 claimed cases of illness in the Lower Mainland and on Vancouver Island. The source of the contaminated product was located and the incident was investigated. Following this incident, many greenhouse growers were inspected to ensure they were using pesticides according to label directions. In addition, many vendors were checked to ensure they were selling restricted pesticides only to certified applicators.

In a separate investigation, water samples were taken from wells near Abbotsford to determine whether agricultural pesticides were accumulating. There was no evidence of well water contamination. The Pesticide Control Program also funded additional sampling to evaluate pesticides in surface water in agricultural areas and to evaluate levels of copper sulphate, following treatment in a reservoir.

Technical Information and Publicity

The branch continues to supply the public with advice on the safe use of pesticides. A central library of pesticide references has been established in the Victoria office.

An information seminar was conducted with representatives of 15 structural pest control companies on Vancouver Island to review changes in the registered use of chlordane.

Outside speakers are invited to lecture in the program's adult education courses, and staff are requested by other agencies to be guest lecturers. For example, staff made presentations in lecture series sponsored by universities and colleges, forestry pest control committees, agricultural pest control committees, gardening and horticultural community groups.

SUMMARY OF PESTICIDE CONTROL PROGRAM ACTIVITIES BY REGIONS
1985/86 FISCAL YEAR

	Region 1	Region 2	Regions 3 & 4	Region 5	GRAND TOTAL
1. LICENCING:					
Vendor Licences Issued	156	770	184	118	1228
Service Licences Issued	175	700	150	156	1181
2. PERMITS:					
Pesticide Use Applications	159	129	201	292	781
Special Use Applications	3	15	9	14	41
Restricted Use Applications	12	28	1	-	41
3. TRAINING & CERTIFICATION:					
Pesticide Applicator & Dispenser Courses	22	44	11	24	101
Course Attendance	635	800	432	573	2440
Study Kits Issued	570	961	706	633	2870
Examinations Written (Courses & Home Study)	862	1647	1180	1010	4699
Certificates Issued	734	1394	871	713	3712
Failures	128	253	309	297	987
4. COMPLIANCE:					
Vendor & Applicator Inspections	329	1211	159	532	2231
Permit Inspections	77	36	132	32	277
Licences Susp/Revoked	6	-	-	22	28
Permits Susp/Revoked	1	-	-	-	1
Charges Laid	3	15	4	1	23
5. INVESTIGATIONS:					
Pesticide Accident/Misuse Investigations	33	109	47	10	199

Provincial Emergency Program

As defined by statute, the role of the Provincial Emergency Program is to provide guidance, leadership, coordination and liaison with all levels of government, ministries and Crown corporations, in order that resources are used to the greatest advantage in the event of an imminent or actual emergency or disaster; to mitigate the effects on the people, environment and property; to ensure continuity of government.

Objectives of the program are:

1. To protect life and minimize damage from environmental, man-made, and natural disasters by:
   a. assuming responsibility for an appropriate level of preparedness and emergency planning at the provincial, regional, and local government level;
   b. initiating and participating in emergency planning and arrangements with the federal government, international jurisdictions, territorial governments, and other provinces;
   c. facilitating the establishment of public warning systems, information programs and emergency reporting and response communications;
   d. coordinating emergency response and maintenance of essential services during an emergency.
2. To protect life and minimize damage from incidents involving special wastes or dangerous goods by planning and coordinating effective ministry regional and headquarters response systems.
3. To oversee recovery from disasters by coordinating the provision of disaster relief and assistance measures.

Legislation Administered

Emergency Program Act
Flood Relief Act

General

Proactive emergency arrangements sponsored and encouraged by the program better prepare the province to carry out its reactive roles and responsibilities during incidents and emergencies throughout the year.

Municipalities benefited from this proactive approach in a number of areas. A pro forma bylaw which fully enables local governments under the Emergency Program Act was circulated and adopted in a number of instances. The regulation which empowers municipalities to establish and put into operation emergency plans was updated and additional steps were taken to revamp other regulations. The amendment of the Emergency Program Act to permit greater involvement in this vital function of government by regional districts was advanced to ministry executive.

The program organized a major conference designed to enhance integrated emergency planning and response within and adjacent to the province. The first annual meeting of the Northwest Emergency Officials Conference was held in Victoria in October and involved state, provincial, territorial and federal representatives from all bordering jurisdictions.

Support was given to the Province of Alberta in its sour gas well contingency planning, as well as to the State of Montana in its planning for medical emergencies in remote areas.

During this fiscal period, the program continued to support industry through emergency preparedness planning, advice and assistance. Major utilities were active in the development of plans and exercises to further safeguard the safety of downstream communities. The program also made representations to the federal-provincial task force on offshore hydrocarbon exploration in support of appropriate environmental and staff safety measures.

Mutual aid and joint emergency arrangements continued to be acquired to the benefit of British Columbians. A revised Workers' Compensation agreement with Emergency Planning Canada was drafted and reviewed in consultation with a number of government authorities. Federal government discussion papers on public safety legislation and the concept of wartime operations were studied by various provincial departments, with the results collated by the program.

Computerization of the program information management system was advanced to an operational level to permit speedy data retrieval on any one of the hundreds of operational and training tasks or volunteers supported by the program. Financial management and special project administration have also experienced incresed efficiency as a result of recent hardware and software acquisitions by the program.

Local Governments

134 incorporated municipalities, out of a possible 143, have emergency programs and, in most instances, an area coordinator established. As well, many unincorporated settlements have also designated people responsible for local programing. These individuals are employed by contract with the Provincial Emergency Program or by the local/regional government authority. This compares with 121 communities a year ago.

During the severe 1985 forest fire season, emergency social services were delivered to hundreds of persons forced to evacuate by major fires. Working cooperatively with the Fire Commissioner's Office, Forest Service and Ministry of Human Resources, the program provided shelter and other services to those affected.

Other communities in the lower mainland received direct support in the form of successful applications by the program to the Joint Emergency Planning Program (JEPP) of the federal government. These completed projects focused on communications within the City of Vancouver emergency operations centre and between Greater Vancouver communities. Several other initiatives in the field of improved emergency response preparedness for dangerous goods incidents, tsunamis, and other public welfare emergencies were submitted to JEPP administrators for adjudication at fiscal year end.

Provincial Organization

The Provincial Emergency Program operated with seventeen head office staff and nine regional staff located in the five regions of the Ministry of Environment.

A total of 620 emergency tasks were authorized, involving a variety of program services and staff skills. Most operational tasks are handled entirely by local authorities with financial administration at the program level.

Volunteer emergency program workers worked with other emergency services in 15,904 hours of operational tasks.

The program assisted the Ministry of Education in its assessment of earthquake preparedness needs and was directly involved in the establishment of a pilot earthquake preparedness program for School District #61 (Victoria).

The program continued to cooperate with B.C. Hydro in its development of emergency preparedness plans for its major dams. Support was also given to local communities and police detachments in their development of dam failure contingency plans. The first operational exercise of a major facility plan and downstream community plans was scripted for the Columbia system during the reporting period.

During the spring of 1986, the program coordinated the testing of the Pacific-wide warning system for tsunamis (tidal waves).

The program continued to support the RCMP in fulfilling its responsibility for ground search and rescue.

The B.C. Coroner's Service concluded an understanding with the program regarding the use of PEP volunteers in body recovery operations. The clarification of this issue should result in significant risk reduction to volunteers.

The program sponsored the second annual meeting of the Emergency Advisory Committee which represents all provincial ministries, boards and commissions with an interest in emergency operations.

Emergency Operations

Statistics for the 1985/86 fiscal year reveal less than a one per cent reduction in the number of tasks authorized by the program compared to the previous year. The number of victims (1,281) was 52 per cent of last year's total, while the number of volunteer hours (15,904) required to deal with these tasks was 64 per cent of last year's amount.

Proportionally, ground search and rescue tasks continued to be the area of greatest involvement, with dangerous goods incidents showing a marked increase over last year.

Significant events included:

1. May — forest fire in north threatens gas treatment plant
2. July — forest fires threaten three communities in south
3. September — rockfall adjacent to Westside Estates, Okanagan Valley
4. December — Arco Anchorage grounds in Port Angeles — oil does not migrate to Canadian waters
5. February — ice jams and flooding in Princeton area threaten some improvements.

Communications

Amateur radio operators continued to supply critical backup communications in all regions of the province. Dedicated frequencies and equipment were acquired in the GVRD pursuant to a federal-provincial cost-sharing agreement. This system will be maintained by local programs to ensure that intermunicipal communications are maintained even if all telephone lines are down.

Warning systems were advanced during this fiscal period through the advent of a dangerous goods zenith number (Zenith 2667) province-wide. Separate warning systems exist to obtain early warning for the following contingencies: tsunamis (tidal waves), livestock disease outbreaks, volcanic eruptions, war, flooding and dam failures.

The program maintained a 24-hour telephone answering service in each of its locations. The headquarters duty officer responded to 411 calls during non-office hours in the twelve months referenced in this report. These calls included:

217 Dangerous Goods
8 Earthquake
45 Ground Search
1 Inland Water Search
30 Air Search
9 Train Derailment
12 Flood
6 Tsunamis
58 Fire
25 Miscellaneous

Training

Over 35,000 hours of volunteer time went towards training tasks. Non-volunteer involvement in any of the 422 courses offered around the province can and has included public officers from municipal, regional, provincial and federal levels of government. Private and Crown corporations also took advantage of various course offerings, which covered the following areas:

— Wilderness Survival
— Developing and Exercising a Community Plan
— Basic Search and Rescue
— Search Management
— Cliff Rescue
— Spotter training
— Casualty Simulation
— Disaster Planning Orientation
— Amateur Radio Service
— Orientation for Dangerous Goods Trainers
— Advanced Tracking
— Techniques of Instruction

Additionally, the program nominated 178 B.C. candidates to 67 different courses offered at the Canadian Emergency Preparedness College in Arnprior, Ontario.

As part of its ongoing support to other emergency agencies, the program produced a twelve-minute training video for the RCMP. Entitled "Search and Rescue in B.C.", this tape will be used in roll-call briefings at the detachment level throughout the province.

Dangerous Goods

With the enforcement of regulations under the Federal and Provincial Transport of Dangerous Goods Acts, staff safety has been greatly improved. Identifiable placards and markings are now required on all shipments of dangerous goods.

Hands-on responder training was identified by the program as being an area requiring emphasis. Coordinated design and development of an intensive hands-on course for fire service, industry and government responders was initiated by the program in response to this need.

There were 661 reports of dangerous spills during the year, involving 1,340,754.5 litres of liquids and 2,354,418 kg of solids.

Financial Administration

Although no recovery programs were established during 1985/86, the program administered flood relief programs raised in previous years. A total of $4,164,144 was committed pursuant to three Orders-in-Council bringing total expenditures for the past five years to over $38 million. During the past year, 49 applications for assistance were approved.

The program administers federal cost-sharing programs sponsored by Emergency Planning Canada. During 1985/86 over one-half million dollars was requested or received from applicable federal program arrangements.

Operational expenditures to cover the extraordinary costs associated with over 450 tasks amounted to $551,829.61 or $1,226.29 per task. These disbursements from the Emergency Assistance Vote of the province dealt with such items as staff overtime, vehicle expenses, food and lodging costs and the replacement of damaged articles.

Public Information

The earthquake in Mexico generated considerable public interest in earthquake damage reduction. The program distributed hundreds of pamphlets and information bulletins in response.

New public information materials were limited to a jointly funded telephone directory supplement on earthquakes for incorporation into lower mainland directories. Discussions were commenced with the B.C. Telephone Company con-

cerning the development of a similar supplement on tsunamis for inclusion in coastal directories.

Staff were actively involved in providing public information through speaking engagements, press releases and interviews.

The program compiled a project outline for submission to Emergency Planning Canada. This multi-faceted public information project featured print and audiovisual components designed to satisfy current public protection demands.

OPERATIONAL TASKS, 1984-85 and 1985-86

EMERGENCY TASKS	VIR		LMR		SIR		KOR		NOR		TOTAL	
											85-86	84-85
Air SAR (OPS Only)	2	1	2	4	6	6	3	1	6	8	19	20
Land SAR	53	48	51	53	60	63	19	22	34	38	217	224
Inland Water SAR	7	91	21	22	13	21	2	5	4	23	47	162
DG	21	21	37	9	30	14	17	7	36	7	141	58
MVA	16	10	37	22	49	62	1	1	6	28	109	123
Train Derailment	Ø	Ø	1	1	Ø	Ø	1	Ø	1	Ø	4	1
Earthquakes	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	1	Ø	1	Ø
Fire	3	1	2	3	6	6	4	Ø	4	4	22	14
Flood	8	1	7	3	9	4	1	1	5	2	30	12
Miscellaneous	8	2	5	2	4	5	Ø	Ø	1	3	18	13
Body Recovery	Ø	Ø	4	Ø	3	Ø	4	Ø	1	Ø	12	Ø
Dam Removal	Ø	Ø	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	1	Ø
Dam Failure	Ø	Ø	Ø	Ø	1	Ø	Ø	Ø	1	Ø	2	Ø
Communications	Ø	Ø	1	Ø	Ø	Ø	Ø	Ø	Ø	Ø	1	Ø
TOTAL	118	175	169	119	181	181	52	38	100	113	620	626

Explanatory Notes:

SAR means "search and rescue"
OPS means "operations"
DG means "dangerous goods incident"
MVA means "motor vehicle accident"
VIR means "Vancouver Island (Region 1)"
LMR means "Lower Mainland (Region 2)"
SIR means "Southern Interior (Region 3)"
KOR means "Kootenay (Region 4)"
NOR means "Northern (Region 5)"

VOLUNTEER ENROLMENT STATISTICS
(as of March 31, 1986)

SERVICE	HQ - 0	VIR - 1	LMR - 2	SIR - 3	KOR - 4	NOR - 5	TOTAL MEMBERS
1 - AIR	1	150	245	300	149	498	1343
3 - SEARCH AND RESCUE	---	760	552	1164	602	1040	4118
4 - COMMUNICATIONS	18	180	384	167	21	132	902
5 - TRANSPORTATION	---	---	12	12	3	10	37
7 - RADEF	---	6	1	2	---	---	9
8 - HEALTH	---	65	44	65	58	31	263
9 - PUBLIC INFORMATION	---	12	2	7	---	8	29
10 - PUBLIC WORKS/ENGINEERING	---	17	34	6	1	8	66
11 - WELFARE	---	183	37	26	2	20	268
13 - MISCELLANEOUS	---	3	1	7	---	9	20
14 - HEADQUARTERS	1	62	62	100	42	111	378
TOTALS	20	1438	1374	1856	878	1867	7433

Surveys and Resource Mapping Program

No major changes in branch organization were implemented during the past year as the Surveys and Resource Mapping Program continued to focus on the design, analysis and application of technological systems so as to achieve timely and efficient production of base maps, interpretive thematic (resource) maps, reports and other documents. In keeping with the master systems plan, there continued to be phased acquisition of digital data for the development of geographically related information systems. Supporting the program is an administrative section embracing personnel, accounting, processing and marketing and distribution activities. New administrative systems for time recording and budgetary accounting were introduced. Both are capable of supplying data input for the Project Management Information System (PMIS) initiated last year. PMIS provides a framework for monitoring the progress of projects through to completion and delivery. Phase II of what will ultimately be a 5-level PMIS system was in place by the end of the year.

Base mapping, which is the primary mapping program for the Province, consists essentially of acquiring digital data for application to the development of land-related information systems. Sources of data include aerial photography, survey control, aerotriangulation, photogrammetry, cadastral and planimetric plotting and published (lithographed) mapping. Thematic (resource) mapping produces derivative and interpretive maps as the result of resource data analysis using base maps for spatial correlation in such areas as soil capability, landform or terrain analysis, fish and wildlife management and water investigation.

The branch's development unit specializes in applied systems research and analysis and includes evaluating and adapting computer hardware and software for practical application within the Branch. Examples of development activities included:

1. additional algorithm development for CAPAMP (Computer-Aided Planning, Assessment and Map Production);
2. data base development for land capability evaluation;
3. software testing for grid construction, testing and evaluation of microcomputer-based Computer-Aided Design systems for use in cadastral compilation;
4. a laser-scan pilot project for production of Digital Elevation Models from existing 1:20 000 and 1:50 000 contour layers;
5. integration of Digital Terrain Models with computer-generated planimetry; and
6. improvements to methodologies for satellite image analysis for thematic/resource (e.g. wildlife habitat) mapping.

Internal and interagency liaison continued to be strengthened. Internally, the Technical Advisory Committee was remandated to focus on problems and issues related to production, while externally, a memorandum of cooperation was exchanged between the Surveys and Resource Mapping Branch (provincial) and Surveys and Mapping Branch (federal). The intent of the memorandum is to achieve efficient data exchange, standards development and operational planning at no net cost to either level of government.

A major joint industry-government initiative — Terrain Resource Information Management (TRIM) — was designed as a multi-year project for the production of 1:20 000 base maps of British Columbia. Spin-off benefits will include application of the latest innovations in high technology, production of orthophotos at 1:60 000 or larger scales and multiple options for creating digital terrain models of contours, slope, aspect or drainage. The human and technological resources required for the TRIM project have been identified and additional skills upgrading, training and task assignments initiated where required. Many new jobs will be created and British Columbia industry will be put in a competitive position to succeed in foreign markets.

Statistical Review

As of March 31, a total of 334 projects had been logged into the Project Management Information System data bank, 122 of which were classified as base mapping, 156 thematic projects and 56 other types of operational activity such as integrated surveys, mosaic production and catalogue preparation. In addition, the Surveys and Resource Mapping Branch was a partner in 23 cost-sharing projects ranging from base mapping to

detailed soils studies, terrain analysis and biophysical capability mapping. Participants in the cost-sharing profjects included municipalities, regional districts and other ministries.

Large scale base mapping at 1:2 000, 1:2 500 and 1:5 000 scales was generated by 41 projects during the year. Some 636 layers and detail were produced, consisting of 245 planimetric, 121 topographic, 259 cadastral and 11 orthophoto layers.

Medium scale (1:20 000) base mapping projects numbered 26 with production measurables as follows: 296 planimetric layers, 118 topographic, and 205 cadastral, for a total of 619 layers. Some 111 air photo mosaics were constructed, of which 41 were required by the Ministry of Forests in connection with fire suppression.

The MAPS-BC centre recorded revenues of over $690,000 through direct sale and distribution of maps, reports and air photo products to the general public and government clients. A staff of six processed 14,667 requests by phone, mail and Rapidfax and served 4,502 over-the-counter customers.

The branch's reproduction laboratories processed 267,944 air photos and 263,053 other reprographic products with a gross value exceeding $568,000. Cost recoveries of $436,000 were achieved through sales to the public and other ministries. There was a six-fold increase in the demand for colour prints, mainly as the result of increased requirements by the Ministry of Forests, a pattern which is expected to continue into the future. To cope with the higher volume of colour work, a high-capacity colour-print processor was acquired.

In the survey computations and records unit, a total of 946 Integrated Survey Area monuments and 410 other control points were coordinated through contract and branch resources and data on 2,092 survey stations were formatted in preparation for readjustment of the North American Datum. Other on-going activities included positional computations for petroleum and natural gas well site locations and preparation of a master project plan for software and hardware requirements for management of survey computations and records.

Contract and branch field crews established 22 horizontal and 124 vertical control stations, photo-identified 271 stations, ran 335 km of levels, recorded 815 cadastral ties, targetted 179 cadastral ties and established survey control for 426 maps. A total of 862 Integrated Survey Area control monuments were linked by survey and new ISAs declared in Oak Bay, Port Alberni and Burnaby.

Soil surveys were completed for seven projects, resulting in the production of 107 soils maps and 163 interpretive maps.

Administration and Technical Services

Financial Services Branch

Financial Services Branch provides accounting services for the ministry, including preparation of annual estimates, budgetary control, preparation and distribution of payroll data, processing of accounts payable, billing and collection of revenue, promulgation of financial policy and procedures, and the preparation of financial reports and summaries to meet internal and external requirements.

In August the ministry received the "Report On the Revenue Administration Review of the Ministry of Environment" which was prepared by a joint review team staffed by personnel from Treasury Board Staff and the Ministry of Environment. The report identified a number of opportunities for additional revenue, for simplified administration at reduced cost and for improved controls. The Ministry has addressed the recommendations and taken appropriate action.

Financial Services conducted an extensive training program in financial management for branch and regional staff. Training sessions were held in Victoria and in all regional and sub-regional offices plus Fort St. John. Topics covered included Contract Administration, Spending Authorities, Financial Management Policy, Accrual Procedures, Cash Control, Purchasing and SRB Computer Training. This initiative was very well received and should be conducted on an annual basis. Progress was made during the year on the development of the ministry's Asset Control System. A successful pilot program was conducted for the office inventory component of the system. Implementation is scheduled for the 1987/87 fiscal year, except for the warehouse inventory component, which is being implemented on a region-by-region basis that will not be completed until the 1989/90 fiscal year.

Other significant achievements included major additions to financial policies and procedures, the introduction of an expanded chart of accounts to accommodate the requirements of both the Office of the Comptroller General and a newly introduced Project Budgeting System, and an improved FTE reporting system.

The Statement of Revenue and Recoveries and the Statement of Expenditures by Appropriation for the fiscal year ended March 31, 1986, contained in this annual report have been prepared by management in accordance with the accounting policies adopted by the Province of British Columbia. These statements are incorporated in the combined financial statements of the Province, which are examined by the Auditor General. However, at this time the audit examination leading to the expression of an opinion on the combined financial statements is not yet complete.

MINISTRY OF ENVIRONMENT

STATEMENT OF REVENUE AND RECOVERIES

For the Fiscal Year Ended March 31, 1986

REVENUE:		
Water Act:		
Power		$212,015,969
Waterworks and Irrigation		565,286
Domestic, incidental use and fees		1,309,428
		$213,890,683
Wildlife Act fees and licences		9,153,161
Sale of maps and air photos		375,216
Pesticide licences and exam fees		102,849
Marine Resources licences and permits		158,891
Miscellaneous		138,301
TOTAL REVENUE		$223,819,101
RECOVERIES		
Federal Government:		
Canada-British Columbia Joint Development Act	$2,345,444	
Provincial Emergency Program	363,744	
		$ 2,709,188
B. C. Hydro:		
Canada-British Columbia Hydrometric Agreement	$ 218,327	
Fisheries and Wildlife	549,538	
		$ 767,865
State of Washington:		
Zosel Dam		$ 336,500
TOTAL RECOVERIES		$ 3,813,553
SPECIAL PURPOSE FUND:		
Habitat Conservation Fund--Fees	$1,377.703	
--Other	200,057	$ 1,577,760
TOTAL REVENUE AND RECOVERIES		$229,210,414

MINISTRY OF ENVIRONMENT

Statement of Expenditures by Appropriation

For the Fiscal Year Ended March 31, 1986

Vote No.	Description	Appropriations	Actual Expenditures
26	Minister's Office	$ 169,073	168,638
27	Resource and Environmental Management	91,605,504	86,150,536
28	Emergency Assistance	2,403,500	563,322
29	Economic Renewal-Water Management Capital Construction Projects	4,000,000	3,981,716
	STATUTORY -		
	Flood Relief Act-Flood Costs	1,541,009	1,541,009
	Emergency Program Act - Purchase of Property Subject to Hazard	2,623,135	2,623,135
	Skagit Environmental Enhancement Act - Skagit Environmental Endowment Commission	349,589	349,589
	Financial Administration Act - Extinguishment of Debt	3,225	3,225
	Environment Management Act - Environmental Emergency	19,082	19,082
	Special Fund-Wildlife Act - Habitat Conservation Fund	1,804,000	1,460,962
		$104,518,117	$ 96,861,214

Personnel Services

Personnel Services provides a wide range of human resource management services to the ministry, including recruitment and selection, salary administration, job and organizational analysis, contract administration, collective bargaining, employee relations, staff development, safety, and records administration.

Although recruiting activity returned to near-normal, classification issues dominated personnel work in the branch during the fiscal year. Delegation of classification responsibility to the ministry, limited turnover and limited job vacancies within and outside of government all contributed to the increased pressure on our classification systems and work volume. Much effort was devoted to the development of a new classification plan for employees engaged in technical work throughout the ministry. Concurrent with the introduction of a new management classification plan, the ministry also established a management classification committee. Considerable staff time during the year was again devoted to placement and counselling of staff who were relocating. Retirements during the year were also up 75 per cent over fiscal year 1984/85 which was the previous high year.

The formalizing of branch executive meetings, now held on a scheduled basis, has done a great deal towards clarifying issues within the branch and has added impetus to the development of a detailed branch strategic plan.

As a means of better serving the Ministry, a "job enrichment" program was implemented wherein the four distinct positions occupied by personnel clerical staff were combined into one job with the workload split four ways. This arrangement has proven to be very popular with our employees, significantly increasing their job interest, and with our clients by providing a contact focus of their Personnel Officer or clerk for all personnel matters. In conjunction with this change, there was a reassignment of client branches and regions to the personnel officers.

Considerable effort during the year was also devoted to collective bargaining and the uncertainty resulting from potential strike action.

The Staff Development and Safety Section serves the priority educational, health and safety needs of ministry employees. Through its diverse activities, the section helps prepare employees to meet the ministry's program objectives.

Supervisory training, computer training, technical training and safety training were major program thrusts this year. Within each branch and region numerous educational programs were designed, delivered and evaluated. In addition, ongoing consultation on occupational health and safety issues continues to be an important dimension of our service.

The section commenced the successful implementation of the Performance Planning and Review process this year. Phased in over two years, fifty percent of ministry supervisors received training this year with the remainder to follow next year. This program provides an important new management tool to supervisors and employees which focusses on the achievement of results for employees over a specified time frame.

The section designed and delivered a new program entitled Safety Management for Supervisors. This program was initiated to clarify the legal and policy responsibilities in occupational health and safety all supervisors undertake in the Ministry.

A cooperative arrangement with the Ministry of Lands, Parks and Housing enabled the expanded delivery of the Taking Charge of Your Career program to women in various locations around the province. In addition, the ministry provided tangible support to a new program initiative entitled Men and Women in Management which was made available across government.

Sixty-one per cent of the total volume of training this year used in-house resources. This represents an excellent return on training investment ratio for the ministry. It is made possible by the expanding partnership between the section and the people it serves. Despite a reduction in the human and financial resources of the section, we were able to respond to requests for service from all regions, branches and programs.

Finally, the section produced a Time Management Handbook, conducted job safety analyses for high hazard tasks in regions and developed educational reources for ATV and snow machine training.

Central Services Unit

The function of Central Services is to meet the accommodation requirements of the ministry, administer the ministry vehicle fleet including purchasing and insurance, and provide other support services including mail room/courier, parking, security, furnishings, photocopiers, warehousing, insurance, records management, telecommunication and inventory control of assets.

The unit's accomplishments during the past year include the following: accommodation of 1,400 personnel; completion of a major warehousing consolidation in Victoria; processing of registration and insurance for 800 motor vehicles and other mobile field equipment; coordination of fleet reductions ordered by Treasury Board and preparation of a comprehensive Annual Vehicle Plan; processing of 267 requests for telephone and radio equipment and establishment of a capital fund for the purchase of radios; administration of all ministry insurance coverage; a review of operational use of some 700 small boats and outboard motors and reassignment of equipment as required; liaison with the Director of Material Administration in Purchasing Commission to dispose of all ministry surplus assets; administration of the supply and maintenance of 68 photocopiers; introduction of the Administrative Records Classification System as a pilot project for five Victoria branches and Region One. The implementation of an Automated Records Management System to be used in conjunction with the Administrative Records Classification System was begun. In addition, 800,000 pieces of incoming and outgoing mail were processed and the semi-annual edition of the ministry-wide Postal Address and Telephone Directory was published.

Planning and Assessment Branch

In an organization with such a diversity of programs as those of the Ministry of Environment, there is a need for coordination of technical information to enable the ministry to achieve its objectives. The Planning and Assessment Branch assists the ministry executive in achieving this goal by:

- — representing the ministry on inter-agency policy or planning and project assessment reviews
- — preparing environment management plans for the ministry executive, programs and regions
- — preparing integrated ministry-wide analysis of all major project development proposals
- — providing economic and social analysis across the ministry.

Inter-Agency Activities

In October 1985, the Minister of Environment appointed the Wilderness Advisory Committee to make recommendations on land use for 24 areas where wilderness or natural area protection had been proposed, and on the policy and processes for making decisions on wilderness in the future. The Planning and Assessment Branch represented the Ministry of Environment as the chair of an inter-ministry committee to provide technical information to the Wilderness Advisory committee during its four-month review. The branch also prepared a ministry statement on current policies and procedures within the ministry for wilderness protection.

The branch also represented the ministry on the Flathead River International Study Board, which was established in May 1985 by the International Joint Commission to review the potential impacts of the proposed Sage Creek Coal mine on the water quality and flows in the Flathead River at the International Border and downstream. The board, which has three Canadian members and three American members, will report to the commission in December 1986. Public meetings were held by the commission in July 1985 to review the scope of the study and will be held in 1987 to review the commission's report.

In the fall of 1985, the Canadian Council of Resource and Environment Ministers (CCREM) established a task force on research coordination to develop a cross-Canada inventory of current environmental research projects and promote opportunities for joint ventures in research by member jurisdictions. The branch represents the ministry on this task force. A first edition of the research inventory will be released in late 1986.

Other inter-agency studies on which the branch represented the ministry included the drafting of an environmental management plan for the Cowichan Estuary (involving the federal Department of Fisheries and Oceans; the N.W. Development Task Force (Environment, Energy, Mines and Petroleum Resources and Economic Development), in which the branch coordinated environmental reviews of a number of mines and associated infrastructure (roads, powerlines, energy sources); and the federal-provincial Fraser River Estuary Management Plan, for which the branch acts in a coordinator role. Branch staff continued to manage the inter-agency environmental assessment processes for all developments in the Cowichan and Fraser River estuaries as required by Cabinet Order-in-Council. The branch also chaired a federal-provincial-local government committee to draft a strategy for controlling exhaust emissions from motor vehicles and thus improve air quality in the Lower Mainland. Branch staff continued their representation on the Canadian Environmental Assessment Research Council, the Sea Use Council Advisory Board, the Marine Traffic Advisory Council and the Pacific Advisory Committee on Oceanography.

Planning Activities

Diversification continued to be the key to the branch's planning activities this year, with involvement in all levels of ministry planning from provincial policy to operational. At the provincial level, the ministry Priorities Statement, the Air Management Plan, and the branch's own corporate statement, all three of which were begun last year, were completed. The branch was asked to assist in the development of a corporate statement for the provincial Environmental Laboratory and to assist in developing a ministry-wide approach to project budgeting, which linked program budgets to program objectives. In addition to planning at the provincial level, the branch coordinated a number of ministry policy papers on such subjects as estuary and coastal wetland protection, environmental impact mitigation, and criteria for the reservation of stream flows for fish, recreation and waste dilution.

At the regional level the branch continued to work with the Wildlife Program in the preparation of regional wildlife plans. The prototype plan, begun last year, was far enough advanced that work could start on the other seven regional plans covering the remainder of the province.

As in past years, the major area of planning activity continued to be the preparation of sub-

regional strategic plans. These plans provide for the integration of the resource management activities of the ministry, establish management objectives based on an analysis of supply and use of environmental resources and, along with provincial and regional program plans, give direction to the ministry budgeting process. The water management plan for the Cowichan-Koksilah basin, begun last year, was substantially completed, and four other plans initiated. These four are a water management analysis of the Nechako River, an environmental management plan for Shuswap Lake, and wildlife management plan for Shuswap Lake, and wildlife management plans for the Bulkley Valley and Nechako Basin.

Although operational planning is primarily a program responsibility, the branch is often asked for assistance where inter-program coordination or economic services are required. In addition to completing the Inonoaklin fishway analysis and the Lower Dean River management plan, the branch began work on a water quality analysis of the water source for the Summerland Trout Hatchery, and on a series of operational plans for the Elk Valley. The latter are meant to implement the recommendations of the Elk-Flathead strategic plan and coordinate the environmental management activities of government and the five coal mine operators.

Over the year, the branch prepared ministry submissions on 22 Official Settlement Plans drafted by regional districts. These submissions include recommendations for the conservation of fish and wildlife habitats and other environmentally sensitive areas, long-term planning for waste and water servicing, and information on environmeental hazards and settlement suitability.

Project Assessment

Metal and Coal Mine Review

Over the past year 13 mining projects — 7 coal, 1 copper and 4 precious metal — were dealt with in the new Mine Development Review Process. The major projects reviewed included the Mt. Klappan, Quintette-Skikano, Telkwa and Fording-Kilmarnock coal projects, the Kutcho Creek copper project, and the SEREM-Lawyers Pass and Nickle Plate gold projects. The branch also represents the ministry on the Reclamation Advisory Committee, thus being responsible for coordinating the review of all phases of mining activity from exploration to abandonment. During the year the branch was appointed to the joint government/industry/university Research and Technical Committee for Reclamation which coordinates and encourages research on mine reclamation and environmental management. Work continued on the redrafting of the guidelines for mine development in the province, but because of the large number of mine project reviews, these guidelines will not be published until 1987 at the earliest. A summary of current policies and practices with respect to minesite management was produced for the I.J.C. Flathead River International Study Board.

Energy, Transportation and Industrial Projects

Although a number of energy projects were proposed for development during 1985, because of poor energy markets, few were actually developed. Those projects for which environmental assessments were completed included the Remington gas process plant and pipeline and the Ocelot Industries proposed ammonia plan at Kitimat. A second ammonia plant, Westcoast Transmission Company's proposal at Annacis Island, was under review when the project was postponed indefinitely in mid-1985. Work was started on a provincial response to Alcan's legal challenge to the right of the federal Department of Fisheries and Oceans to maintain instream flows in the Nechako River. The branch began to prepare a strategic plan for water management in the Nechako system that would analyse various combinations of water allocation for energy, fisheries and other water uses.

The branch identified and analysed environmental impacts associated with the development of possible industrial sites throughout the province for the Ministry of Economic Development. Similarly the branch assisted the Ministry of Energy, Mines and Petroleum Resources in evaluating impacts of exploratory drilling for oil in coastal areas and, together with Water Management Branch, in determining which flood reserves should be repealed based on reduced need for energy project development.

Federal-Provincial Project Assessments

The branch acts as ministry representative on major project reviews coordinated by the federal government under its environmental assessment and review process (EARP). The most important of these was the joint federal-provincial review of offshore oil and gas exploration. An independent panel, established by the federal and provincial Ministers of Environment in 1984, held public meetings in October and November 1985 and completed its report in April 1986. The branch provided support services for the panel and also coordinated the ministry's technical analysis of offshore hydrocarbon exploration, which was presented to the panel in November.

In addition, the branch coordinated ministry input to the panel established by the federal gov-

ernment to review the environmental effects of multiple transportation developments in the Fraser and Thompson corridor. It also continued to represent the ministry's input to the environmental management of the Roberts Bank port extension, and the Canadian Pacific Railway's siding extension.

Post-Project Evaluation

Where possible and practical, the branch links environmental planning, project assessment and post-development monitoring to determine how well environmental management measures achieve environmental objectives outlined in ministry plans or policies. During 1985, the branch drafted a ministry policy and procedures to establish a more systematic approach to post project evaluation. Input was provided from several agencies of the federal and provincial governments and the private sector at a workshop sponsored by the branch in January 1985.

Socio-Economic Analysis

The branch provided economic and social analysis to a number of programs during the year. For the Wildlife Program, the branch completed all its economic surveys of both hunting and non-hunting recreational enjoyment of wildlife and published a number of reports. A public summary of all these will be prepared during 1986/87. In addition, the branch participated with the Canadian Wildlife Service in publishing a major economic analysis of the value of wildlife to Canadians. Work was started on an economic model to project demand for hunting for moose and deer in various regions of the province based on information relating to travel costs, recreation quality and access.

For the Fisheries Program, the branch undertook an economic assessment of allocating hatchery reared stock to the various regions and published survey results of resident and non-resident angling values. An updated economic analysis of tidal sport fisheries was completed by the branch in conjunction with the Department of Fisheries and Oceans. With this information, it is now possible to compare directly the economic and employment opportunities associated with both the salmon and commercial sport fishery. It assisted the Kootenay Region in evaluating a proposed fishway in the Inonoaklin River as a compensatory measure to offset the losses resulting from the development of the Arrow reservoir. Public review of this analysis was scheduled for the summer of 1986.

In Waste Management, the branch completed its economic analysis of alternative methods for reducing phosphorus input to the Okanagan Lakes, leading to a Cabinet decision to allocate $26 million over the next three years to implement phosphorus control measures. Late in the year the branch assisted the project implementation office in Penticton in designing and implementing a public information program.

For the Administration Program, the branch undertook a review of B.C. Building Corporation's policy on establishing rents for the provincial hatcheries and laboratory. This review was discussed with the Corporation and Treasury Board, with a decision on rental policies anticipated in 1986.

Various applied economic studies were undertaken for specific projects such as the protection of the Khutzeymateen Valley for wildlife, the allocation of funds for fish and wildlife enhancement projects and the costs of controlling vehicle emissions.

Environmental Laboratory

General

During 1985/86, the Environmental Laboratory provided chemical and biological analytical services (including fish bioassay) to the ministries of Environment, Forests, Agriculture, Health and Finance. It also provided analytical services to Crown corporations such as B.C. Hydro and some municipalities. Routine tests conducted at the laboratory totalled 2,319,180 workload units (one workload unit is one minute of analytical time). In addition, project time for method development and sample management system resulted in 433,340 workload units. The laboratory also carried out 57 legal analyses resulting in five court appearances. Under the program jointly managed by Environment and Health, 827 public water samples were analyzed.

Special Services Division

The Special Services Division provides services in the areas of air quality monitoring and quality assurance.

The Air Quality Sections continued to provide both laboratory analyses and a data reporting service for ministry air quality monitoring within the province. Some 40 continuous monitors were operated at 26 air quality monitoring stations; seven of these stations were equipped with real time data capture during 1985/86. In addition, approximately 20,000 laboratory analyses of airborne pollutants, including precipitation, were carried out. Project work authorized by the Waste Management Branch, either continued or was initiated in the specialized areas of TRS (total reduced sulphur) monitoring, inhalable particulate monitoring and toxic organics. In addition, the Environmental Laboratory for the first time gave the ministry Opacity Reading Course. Approximately 30 regional staff either were certified or re-certified as Smoke Opacity Readers. Report preparation and laboratory analyses were carried out for a total of 16 stack surveys.

The Quality Assurance Section carried out 24 internal audits of laboratory test methods. In addition, work commenced on a statistical analysis that provides a determination of the accuracy and confidence limits associated with all high through-put test methods. Participation in various inter-laboratory comparison studies was continued, including studies for precipitation and surface waters for the federal-provincial committee dealing with Long Range Transport of Acid Pollutants (LRTAP). Performance audits of 60 continuous TRS and SOz2y monitors (ambient and stack) operated by industry were carried out. Periodic audits of the 40 ministry continuous monitors were similarly carried out.

The following reports were completed in 1985/86:

- Manual for Auditing Continuous Emission Measurement Systems
- Measurement of Total Reduced Sulphur Compounds in Ambient Air [Env. Sci. Technol. 20, 517 (1986)]
- Calibration and Operation of Continuous Ambient Air Monitors (Revised edition)
- Laboratory Quality Assurance Manual (draft only).

Operations Division

The Operations Division continued to provide chemical services for the analysis of inorganic and organic constituents and biological services for taxonomic identifications, bioassay and microbiological testing of water, wastewater, sediments and biological materials. During 1985/86 the Operations Division completed 1,785,102 workload units of routine tests.

During the past several years there has been an increasing demand for the analysis of carcinogenic and mutagenic organic compounds. In order to achieve the ultra low detection limits required for these compounds, development work was initiated. Work has also begun on the adaptation of the recently acquired fluorescence detector for polyunuclear aromatic hydrocarbon determinations. Quality assurance work associated with participation in the Laboratory Work Group for the federal-provincial Monitoring Agreement was initiated during this fiscal year and is being continued.

Projects completed during the fiscal year include:

- development of a multi-pesticide scan for simultaneous detection of a wide spectrum of organophosphorus and organochlorinated pesticides,
- marine bioassay studies utilizing mussels to measure acute and chronic toxic conditions,
- development of in situ fish egg bioassays to study the effects of toxicants on the developing egg stage and early life states of fish,
- determination of thiocyanate and cyanate by ion chromatography.

Computing Services Branch

Computing Services Branch is responsible for providing cost effective word processing and data processing services to the ministry programs for meeting their program objectives.

In the 1985/86 fiscal year Computing Services completed enhancements to several systems. The next release of the Financial Accounting System was completed, which increased the reporting capabilities and provided for accrual processing. There were two new releases to the Environment Laboratory Sample Management System. These included additional functions for the Air and Biological Sections to allow for more efficient processing of sulfation plate and fluoridation plate validation routines and entry menus for specialized data entry.

In addition, the Environmental Quality Information System was replaced by three new systems, Meteorological Information System, Continuous Air Management Information System, and the System for Environmental Assessment Management. These systems provided regional Waste and Air resources with access to monitoring data. For Wildlife a Summary Statistics database was developed providing regional reporting on Wildlife Harvest Data. As well, a Warehouse Inventory System was developed for the Victoria warehouse. This system will be implemented in the regional offices in 1986/87.

This year also saw continued uncertainties regarding the future of data processing within government. There was a total freeze on system activities announced on August 5, 1985 which remained in effect for the rest of the fiscal year.

Information needs reviews were completed in both the Fisheries and Wildlife programs. As a result, systems plans are now being developed to ensure that the identified needs can be satisfied in a cost effective manner consistent with the overall technological direction of the ministry.

In order to assist the ministry in understanding the uses of information tools and identify the training that individuals require, a training needs project was completed. This information will be used by the ministry Information Steering Committee to assist them in making policy decisions on the future direction of ministry systems.

Conservation Officer Service

General

The objectives of the Conservation Officer Service are to ensure compliance with ministry legislation by:

1. providing a viable prevention program through public education and involvement,
2. providing an environmental surveillance and protection program,
3. providing a patrol and investigative capability in order to apprehend violators, deter would-be violators and institute proceedings for prosecution under legislation for which this ministry has responsibility,
4. providing for the protection of the public and property from problem wildlife.

Accomplishments

The Conservation Officer Service consists of 86 field officers, 13 senior conservation officers, five regional conservation officers and five Victoria headquarters staff.

Statistics 1985	1984 (increase/ decrease)
3,435 violations reported by public	−1%
5,207 violations found by conservation officers	−3%
3,427 charges	+12%
2,329 convictions registered (72% rate)	+4%
2,079 warnings issued	−22%
1,102 cases unsolved	−9%
$239,399 fines levied	+13%

The Conservation Officer Service is involved in the following four programs:

Wildlife Program

The following acts are enforced:

Wildlife Act
Firearm Act
Migratory Birds Convention Act
Game Export Act

Conservation officers spent 32 per cent of their total time on wildlife enforcement duties.

Statistics 1985	1984 (increase/ decrease)
2,455 violations reported by public	+4%
2,905 violations found by conservation officers	−16%
482 violations unfounded	−1%
5,360 total actual violations	−8%
2,093 charges	−7%
1,443 convictions	−14%
977 warnings issued	−32%
$153,409 fines levied	−3%

The violation rate for hunters was 13 per cent (13 out of every 100 hunters checked in the field were found to be in violation of an Act or Regulation). This rate is 4 per cent lower than 1984.

Wildlife Control

Conservation officers spent 8 per cent of their time handling nuisance or dangerous wildlife complaints and responded to 911 of 4,394 complaints from the public in this regard, as follows:

	Complaints received	Acted upon
Black bear	994	431
Grizzly bear	29	18
Cougar	420	127
Wolf	225	89
Other	2,725	246

Fisheries Program

These Acts are enforced:

Federal Fisheries Act
Fisheries Act (Provincial)

Conservation officers spent 18 per cent of their operational time on fisheries and habitat protection duties.

Statistics 1985	1984 (increase/ decrease)
573 violations reported by public	−16%
2,196 violations found by conservation officers	+24%
1,202 charges	+63%
825 convictions registered	+61%
981 warnings issued	−8%
168 cases unsolved	−33%
$68,540 fines levied	−62%

Waste Management Program

The following Acts are enforced:

Waste Management Act
Environment Management Act
Litter Act

Conservation officers spent a total of 2 per cent of their operational time on the enforcement of Waste Management legislation.

Statistics 1985	1984 (increase/ decrease)
309 complaints reported by public	−6%
88 violations found by conservation officers	−17%

104 charges	+82%
58 convictions registered	+93%
88 warnings issued	−33%
43 cases unsolved	−22%
$17,050 fines levied	+119%

Water Management Program

This program enforces the Water Act.

Conservation officers spent a total of .60 per cent of their operational time on enforcement of the Water Act.

Statistics 1985	1984 (increase/ decrease)
46 complaints reported by public	−35%
12 violations found by conservation officers	−33%
1 charge	−66%
1 conviction registered	−50%
$200 fines levied	−60%

Other

Conservation officers, in the course of their duties, lay charges under various other acts, including the Criminal Code. In the year 1985/86, 11 charges were laid under other Acts resulting in one conviction, with a total of $150 in fines being levied.

Administration matters consumed 33 per cent of their overall time.

Prevention

Conservation officers spent a total of 4,547 man-hours on community information and education related activities representing 3 per cent of their time.

Training

During the year, two basic firearms training courses were conducted in order to train a number of conservation officers in the policies, procedures and practices concerning the carrying of firearms. Training was also provided for 20 conservation officers in how to effectively deal with hostile individuals and for 16 in cross-cultural courses. These seminars are worthwhile experiences and will eventually be given to all conservation officers.

Additionally, conservation officers attended courses such as police investigators, supervisory, instructors and field trainers, sponsored by the Justice Institute and the RCMP Academy in Vancouver.

A number of conservation officers attended the transportation of Dangerous Goods course over the year, as well as the Falling and Bucking Course.

At the request of the RCMP, seminars in wildlife/fisheries enforcement were conducted by senior conservation officers in two areas of the province. This has resulted in increased activity by the police in investigating and prosecuting violators. These seminars will be continued when requested.

Comments

Generally speaking, the Conservation Officer Service increased its level of operations capability with the filling of vacant positions.

Cougar complaints more than doubled this fiscal year and complaints concerning "other" animals were up 25 per cent. Two reports of cougar maulings were investigated on Vancouver Island. One young girl was seriously injured and rescued by a camp counsellor.

In the Lower Mainland, members of two rod and gun clubs were involved in illegal baiting of waterfowl. One club was closed down to hunting on its own land for seven days and seven members of the other club were charged.

Road checks throughout the province, in cooperation with the RCMP, continue to prove a deterrent to violators and a substantial number of violations are found and persons prosecuted.

Conservation officers continue to increase their public relations responsibilities through meetings with rod and gun clubs, service clubs, schools and youth organizations and with the press. This activity produces very positive results in explaining environmental issues concerning wildlife and in soliciting the assistance of the general public.

Information Services Branch

Information Services Branch provides a wide range of communication services to the ministry and to the public. As the communications management and coordinating agency within the Ministry of Environment, the branch is responsible for strengthening links with the public and for developing understanding and support for the ministry's nine major programs.

To meet this responsibility Information Services provides information about the ministry's programs and services to the public, the media, and special interest groups. The branch coordinates release of information to the media, develops and distributes material to the public and special interest groups on ministry programs and activities, and provides planning and technical support to the ministry's executive in the area of public relations and communications.

Specifically, the branch is responsible for planning and implementing communication strategies on ministry initiatives and priorities; responding to public inquiries; researching and drafting news releases, articles and pamphlets; coordination of ministry advertising and media relations; developing and providing environmental education programs and materials; maintaining a library and reference service for ministry staff and members of the public concerned with environmental issues; developing or coordinating preparation of audio-visual programs, films, videos and public exhibits; and supporting regional and headquarters staff in their communication needs.

During 1985/86, 72 news releases and information bulletins were issued. Fifteen new publications aimed at a general audience were put into production, seven publications were reprinted, and twenty-seven technical publications were produced on behalf of ministry programs (see list following).

Despite a reduced staffing level during the fiscal year, the branch fielded a considerable number of requests, by mail, telephone or in person, for information or publications.

Environment News, the ministry's quarterly staff newsletter, resumed publication and the designation of regional and branch contacts resulted in improved coverage of employee activities.

A large amount of staff time was devoted to coordinating the Conservation and Outdoor Recreation Education (CORE) program, particularly with respect to the large number of telephone enquiries and letters which continued to result from the restructuring of the delivery of courses. Video tapes complementing the CORE program were made available through the distribution facilities of the Provincial Education Media Centre. The appointment of a full-time hunter training coordinator in the Wildlife Branch is expected to further improve communication between the ministry and the program's clientele as well as with the participating agencies and instructors.

The Minister's Environmental Awards recognized the contributions of both industry and the public. Recipients of the awards for 1985 included the Kalesnikoff Lumber Company, Crestbrook Forest Industries, and Pacific Brewer's Distributors Limited in the industrial category; and Mr. Donald Sherling, Mrs. Glenda Ferris, and the late Mr. Cal Woods in the public category.

The branch continued to work closely with the schools and the Ministry of Education to ensure that environmental concerns are included in the curriculum wherever appropriate. Course materials were reviewed in the areas of Biology and Consumer Education.

Pilot testing of the ministry's secondary school education package, "Resources and Wastes," was completed and production was initiated for delivery early in the fiscal year 1986/87.

The ministry library experienced continued heavy demand for services in many areas, including interlibrary loans, acquisitions, computer searches and reference enquiries. A library committee was formed to help find ways the library can offer the best service to its patrons.

Information Services Branch continued to work cooperatively with other ministries and with several federal departments on projects of mutual concern. The most notable was the co-production with Environment Canada of an 18-minute film, "Taming the Fraser," illustrating the importance of flood control to the communities of south-western British Columbia.

The Ministry of Environment published or reprinted (R) the following information brochures and technical and scientific reports in 1985/86:

Information Brochures and Publications

Bear and Cougar Safety Facts (R)
Visit the Fraser Valley Trout Hatchery (R)
Trout Hatcheries in British Columbia (R)
Please Don't Move Live Fish (R)
Mariculture Newsletter (5 issues)
Salmon Pack Bulletin (15 issues)
Releasing Fish Alive (R)
Sport Fishing Regulations Synopsis
Fact Sheet: Handling Waste PCB Ballasts from Fluorescent Light Fixtures

Wolf Management in British Columbia
Guide Outfitters in British Columbia, 1986-87
B.C. Trapping Synopsis
B.C. Hunting Regulations Synopsis, 1985-86
1985 Fraser Valley Special License Hunting Area Brochure
Guidelines for Disposal of Household Type Garbage
The Wilderness Mosaic
Annual Report of the Ministry of Environment, 1984-85
Safe Pesticide Use (R)
Conservation and Outdoor Recreation Education (CORE) (R)
Waste Management Plans
An Introduction to Maps
The Ministry of Environment: A Statement of Priorities 1985-1990

Scientific and Technical Reports

Soils of Southern Vancouver Island
The Value and Characteristics of Non-resident Hunting
The Value and Characteristics of Resident Hunting
Culture of the Blue Mussel at Refuge Cove
Fisheries Production Statistics of B.C.
Methods of Setting Hatchery-Produced Oyster Larvae
Feasibility Study of Establishing Fish Feed Manufacturing Facilities in B.C.
Vegetation of the Wells Grey Study Area
The Effects of Spring Burning on the Productivity and Nutrient Concentration of Several Shrub Species in the Southern Rocky Mountain Trench
Terrain Capability For Residential Settlements: Atlin, B.C.
The Role of Soil Analysis in Resource Management
Dewdrop-Tranquille Regional Wildlife Habitat Study
Soil Constraints For Septic Tank Effluent Absorption
Pollution Control Objectives for the Forest Products Industry of B.C.
Pollution Control Objectives for Food-Processing, Agriculturally-Oriented and Other Miscellaneous Industries of B.C.
B.C. Snow Survey Bulletins (5 issues)
The Vancouver Island Marmot, Status and Management Plans
The Breeding Ecology and Management of White Pelicans at Stum Lake, B.C.
Resident and Non-resident Anglers Survey
Kechika Enhancement Project of Northeastern British Columbia
Muskwa Wolf Management Project of Northeastern B.C., 1984-85 Annual Report
Phosphorus in the Okanagan Valley Lakes
Survey of Wildlife Activities for 1983
Wildlife Management Plan for B.C. (R)
Effect of Harvesting and Transport Conditions on the Quality of Formed Chinook Salmon
Slocan Valley Development Guidelines

Environmental Appeal Board

The Environmental Appeal Board operates under the provisions of the Environment Management Act (1981). Its purpose is to hear appeals to decisions made under environmental legislation. The board, appointed by Cabinet, consists of a chairman and a sufficient number of board members to deal with appeals expeditiously. During the period coverd by this report (1985) there were 21 board members.

Fifty licences, permits or orders of the Director of the Waste Management Branch, the Assistant Director of the Wildlife Branch, the Comptroller of Water Rights and the Administrator of the Pesticide Control Act were appealed in 1985, compared to 33 the previous year. These appeals resulted in 33 hearings, compared to 26 in 1984. There were 61 appellants (43 in 1984), some of whom appealed the same licence, permit or order. A number of the appellants represented organized groups, comprising in total (apart from municipalities and unions) about 3,000 members.

The municipal and union groups that appealed included: the Greater Vancouver Regional District, the City of Port Moody, the City of Port Coquitlam, the City of Ladysmith, the Pulp, Paper & Woodworkers of Canada, Local 9, and the United Fishermen and Allied Workers Union, Local 27.

Of the appellants, 11 won their appeals; 49 lost their appeals and one abandoned her appeal before the hearing was convened. No appeal hearings were adjourned "Sine Die", and one of the "Sine Die" adjournments of 1984 was cleared up.

One of the board's decisions was appealed to the Supreme Court of British Columbia for a second judicial review. This was the Carter appeal against an order of the Comptroller of Water Rights. The results of this review are pending.

In addition to the appeal activities of the Board, two members of the Board also took part in investigations for the Minister of Environment.

The following is a breakdown of the results of appeals concluded in 1985 in relationship to the four ministry programs they concerned.

Wildlife Branch:	
Number of Appeals	7
Number Upheld	5
Appeals Denied	2
Pesticide Control:	
Number of Appeals	31
Appeals Upheld	5
Appeals Denied	25
Appeals Abandoned	1
Waste Management:	
Number of Appeals	11
Appeals Upheld	0
Appeals Denied	11
Water Management:	
Number of Appeals	12
Appeals Upheld	1
Appeals Denied	11

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